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VOLUME TWO

DOCUMENT HISTORY OF WS 117L
(1946 TO REDEFINITION)

SPACE AND MISSILE SYSTEMS ORGANIZATION

HISTORY OFFICE
CHIEF OF STAFF
SPACE AND MISSILE SYSTEMS ORGANIZATION
AIR FORCE SYSTEMS COMMAND

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Prepared by

S. A. Grassly

November 1971

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50. Memo for General Schriever from Capt Babcock, subj: Item for Staff Meeting, 9 May 55.

51. Memo, WDG, for Dr. Ramo, subj: Scientific Satellite, 10 Jun 55.

52. Memo, WDG, C. H. T. for General Schriever, subj: Visit of DOD Satellite Committee - 28 Jun 55, 28 Jun 55.

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55. Minutes of Staff Meeting, WDD, 21 Jul 55.

56. Memo, WDTD, Col Charles H. Terhune, Jr., to Ramo-Wooldridge, subj: Program Data for the Advanced Reconnaissance System, 1 Aug 55.

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64. Memo, WDTSP, BrigGen B. A. Schriever, for Col Terhune, subj: Additional Tasks Assigned to the Ramo-Wooldridge Corporation, 3 Oct 55.

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74. Memo, WDTSC/Maj George R. Vanden Heuvel, for WDT, subj: Advanced Reconnaissance Satellite (ARS) Program, 4 Nov 55.

75. Ltr, ARDC to BrigGen Bernard A. Schriever, Comdr WDD, no subj: 7 Nov 55.

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88. Ltr, WDTST/MajGen B. A. Schriever, to Comdr AFCRC (Cambridge Research Center, subj: Support of Advanced Reconnaissance System, 23 Dec 55.

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21. Ltr, AFDRD-AN to CG, ARDC, subj: Satellite Study, 7 Jul 52.

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27. Ltr, The Rand Corporation to MajGen Donald N. Yates, 10 Feb 53.

28. DF, RDDSS to RDDA thru RDDS and RDDD, subj: Future Large Rocket Engine Requirements, 15 Apr 53.

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108. PAM No. 28, WDD, 7 Sep 56.

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112. DF, WDTR to WDTD, subj: Organization and Manning for WS 117L Program, 28 Sep 56.

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127. MFR, WDTR/LtCol Frederic C. E. Oder, subj: Telephone Conversation with Mr. J. H. Carter - Lockheed MSD, 28 Dec 56.

128. Ltr (S/RD), WDTR/LtCol Frederic C. E. Oder, to Chief, Aircraft Reactors Branch, Attn: Major G. M. Anderson, Division of Reactor Development, AEC, 28 Dec 56.

129. Evaluation Criteria, Jan 57, w/3 Atchs: (A) Technical Evaluation, (B) Development and Production Aspects; (C) System Management Potential.

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136. Memo (C), LtCol Frederic C. E. Oder, for Col Terhune, subj: Visit to Missile Systems Division, Lockheed Aircraft Corporation, 30 Jan 57, 4 Feb 57, w/3 Incls: (1) LAC Organizational Chart; (2) LAC Organizational Chart; (3) Extract MSD 1593, LAC Summary Planning Data.

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138. MFR, Subject: Telephone Call from Mr. Jack Carter, Palo Alto, to General Ritland.

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140. MFR, WDGE/LtCol J. L. Hamilton, subj: Phone call Between Myself and Colonel Ahola - 19 Feb, 19 Feb 57.

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142. Ltr (C), Hq ARDC (RDZG) to LtGen D. L. Putt, no subj, 11 Mar 57, w/1 Incl: Ltr fm USNRL to Gen Ostrander, no subj, 6 Mar 57, w/1 Incl: Ltr, from NAS to Dr. Kaplan, 7 Jan 57.

143. Memo (C), WDTR/Col Frederic C. E. Oder, for Col Terhune, subj: Trip Report - Colonel Oder and Lt Colonel Riepe to Naval Research Laboratory 12 Mar 57 and Pentagon, 22 Mar 57.

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145. Manning Chart, WDTO, 2 Apr 57.

146. Memo, Office of WDD Liaison Officer ABMA, Huntsville, Ala., for General Schriever, subj: Satellite Study, 19 Apr 57.

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148. Memo, WDTL/Col Lawrence D. Ely, for Colonel Charles H. Terhune, Jr., subj: Follow-on Work for WDD, 8 May 57.

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150. Memo (C), Col Frederic C. E. Oder, for Co. C. H. Terhune, subj: Ability of Aircraft Laboratory of WADC to fulfill WDTR requirements, 9 May 57.

151. Memo, WDTI/Col Edward N. Hall, for Col Terhune, subj: Vanguard, 14 May 57, w/1 Incl of 2: (2) RW Study, Proposed Use of IRBM as Booster for Multi-Stage Vehicles, 1 Apr 57.

152. Memo, Hq USAF/LtGen D. L. Putt, for Chairman Scientific Advisory Board, subj: SAB Special Study of Advanced Weapon Technology and Environment, 15 May 57.

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154. GO No. 19 ARDC 21 May 57.

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156. Ltr (C), WDD/MajGen B. A. Schriever to Dr. Albert K. Chapman, no subj, 26 Jun 57.

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160. DF, MCPTA to MCPT, subj: Weekly Diary - 12 Jul thru 18 Jul 57, 18 Jul 57.

161. Briefing (C), Presentation to the Scientific Advisory Board Ad Hoc Committee to Study Advanced Weapons Technology and Environment, 23 Jul 57.

162. Ltr (C), WDTR/Col Charles H. Terhune, Jr., to Deputy CofS, Development, Hq USAF, thru Comdr ARDC, subj: Program Planning Guidance for WS 117L, 30 Jul 57.

163. Memo (C), WDTR/Col Frederic C. E. Oder, for Col Terhune, subj: First Meeting of the SAB Ad Hoc Committee on Advanced Weapons and Environment, 29-31 Jul 57, 1 Aug 57, w/2 Incls.

164. Memo (C), Col Asa B. Gibbs, subj: Anti-Satellite Missile System, 8 Aug 57.

165. Ltr, Ballistic Missile Office/Eugene S. Silberman, Contracting Officer, to Lockheed Aircraft Corporation, subj: Contract AF 04(647)-97, Status of Contract Funds, 13 Aug 57.

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168. 1st Ind to MCP, Hq AMC, 11 Jul 57, subj: Establishment of ARDC-AMC Weapon System Project Office for the Advanced Reconnaissance System, to Comdr AMC, 16 Aug 57.

169. Ltr, AMC (BMC)/Eugene S. Silberman, Contracting Officer, to Lockheed Aircraft Corporation Thru Asst AF Plant Rep, subj: P-600 Expenditure Ceilings FY 58, 21 Aug 57

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171. Ltr (C), Hq USAF/LtGen D. L. Putt, to Comdr ARDC, subj: Program Planning Guidance for WS 117L, 3 Sep 57.

172. Ltr (C), WDTR/BrigGen O. J. Ritland, to Director of R&D, Hq USAF, subj: WS 117L Funding FY 58 and FY 59, 19 Sep 57, w/4 Incls: (1) FY 58 Fin Plan Summary; (2) FY 59 Fin Plan Summary; (3) FY 59 Fin Plan Summary Desired Budget; (4) CY TWX, MCPTA-9-1-E, 12 Sep 57.

173. Memo (C), MCPTA/LtCol James S. Seay, to Gen Funk, subj: Possible Items for Discussion at Lockheed Missile Systems Division, 7 Oct 57, w/1 Incl: Cy ltr to LMSD, 23 Sep 57.

174. Msg (C), AFCGM Cite 51210, to Comdrs AFBMD and BMO, info to Comdr ARDC, 081815Z Oct 57.

175. Msg (C), AFBMD WDG-10-3-E, to CofS USAF, info Comdr ARDC, 090928Z Oct 57.

176. Report (C), title: Report of the Scientific Advisory Board Ad Hoc Committee on Advanced Weapons Technology and Environment, 9 Oct 57.

177. Msg (C), AFBMD WDTR 10-8-E, to CofS Hq USAF, Comdrs ARDC and AMC, 10 Oct 57.

178. Memo, Secy of AF James Douglas, for Gen Lemay, subj: WS 117L, 10 Oct 57.

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181. Msg (C), AFMPP Cite 51689, 1820257 Oct 57.

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183. MFR (C), Col Frederic C. E. Oder, subj: Briefing of Deputy Secretary of Defense, Mr. Quarles on WS 117L (ARS) on 16 Oct 57, 25 Oct 57.

184. Memo (C), WDTL/Col Lawrence D. Ely, for General Ritland and Colonel Terhune, subj: Trip Report, 31 Oct 57.

185. Memo (C), Col Frederic C. E. Oder, for Col Terhune, subj: Informal Reaction of the "Stewart" Committee on Special Capabilities to the 18 October Presentation on WS 117L, 31 Oct 57.

186. Msg (C), Cite AFMPP 52291/COM, to Comdr AMC, info Comdr AFBMD, 012034Z Nov 57.

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191. SSS (C), AFDDC-SP/Col Ralph H. Nunziato, subj: Outer Space Vehicle, 12 Nov 57, w/I InclL (1) Proposed Memo for Sig w/1 Incl.

192. Ltr, WDTR/BrigGen O. J. Ritland, to Comdr ARDC, subj: Priority of Systems Developments, 13 Nov 57.

193. Msg (C), Cite TWX11-033, to Comdr AFBMD, 131913Z Nov 57.

194. Msg (C), Cite TWX 11-049, to Comdr AFBMD, 191850Z Nov 57.

195. MFR (C), WDTIA/LtCol Sidney Greene, subj: Study of Thor for Space Flight Testing, 22 Nov 57.

196. Memo (C), WDTR/Col Frederic C. E. Oder, for Col Terhune, subj: Combined WS 107A-1 - Ws 117L Activities - Basic Integration Plan for AFMTC Operations, 26 Nov 57, w/4 Incls: (1) Organization for WS 117L Operations at AFMTC; (2) WS 117L Data Handling Process-AFMTC Operations; (3) Establishment Procedure for Detailed Test Objectives; (4) WS 107A-1 Flight Test Working Group.

197. Ltr (C), MCPTRM/Col Sherman E. Ellis, to DAF CofS, Hq USAF, subj: Overtime Policy - 117L Program, 27 Nov 57.

198. Ltr, Hq USAF,AFDRD-SS/BrigGen H. A. Boushey, to Comdr ARDC, subj: Approval of Development Plan for WS 117L, 27 Nov 57.

199. Msg, Cite TWX 12-009, to Comdr AFBMD, 031944Z Dec 57.

200. Msg, Comdr ARDC to Comdr AFBMD, Cite RDZCP-12-4-E, 4 Dec 57.

201. Report (C), title: Report of the Scientific Advisory Board Ad Hoc Committee on Space Technology, 6 Dec 57.

202. Ltr, The Ramo-Wooldridge Corporation/L. G. Ludwig to L. G. Dunn, subj: Contractor Organization for Project Able, 18 Dec 57.

203. Ltr (C), WDTR/MajGen B. A. Schriever, to Mr. L. Eugene Root, VP and Gen Manager, Lockheed Aircraft Corp., no subj, 23 Dec 57.

204. Memo (C),Don, to Col MacDonald and Gen Funk, circa Jan 1958, w/1 Incl: Draft Ltr to The Ramo Wooldridge Corp, w/2 Incls: (1) MFR, DAF/Roger Lewis, 8 Sep 5 ; (2) Statement of Work, WS 117L Program Assistance, 1 Jul 57 - 30 Jun 58.

205. ARDC Form 111 (C), Management Report,subj: Advanced Reconnaissance System, WS 117L - Short Title: ARS, WS 117L, 6 Jan 58.

206. DF, MCPTA to MCPT, subj: Weekly Diary - 10 thru 16 Jan 58, 16 Jan 58.

207. Ltr (C), ARDC/LtGen S. E. Anderson, to MajGen B. A. Schriever, Comdr AFBMD, subj: Proposal for Future Air Force Ballistic Missile and Space Technology Development, 22 Jan 58.

208. Msg (C), Cite AFDDC-SP 55521, 222214Z Jan 58.

209. Memo (C), WDTL/Col Lawrence D. Ely, for Col Terhune, subj: WS-609A - Ballistic Research and Test System, BRATS, 31 Jan 58.

210. Msg (C), Cite AFMPP-WS-1 55965, 311822Z Jan 58.

210 #2. Memo (S), Douglas [AF Secretary James H. Douglas] for the Secretary of Defense, subj: Reconnaissance Satellite, 1 Feb 58.

211. Msg (C), Cite AFCGM 56082, 3 Feb 58.

212. Memo, WDT/Col Charles H. Terhune, Jr., to Col Oder, subj: R-W Participation in WS 117L, 4 Feb 58.

213. DF (C), MCPTA to MCPT, subj: Weekly Diary - 31 Jan thru 6 Feb 58, 6 Feb 58.

214. DOD Directive No. 5105.15, subj: Department of Defense Advanced Research Projects Agency, 7 Feb 58.

215. DF (C), MCPTA to MCPT, subj: Weekly Diary - 7 thru 13 Feb 58, 13 Feb 58.

216. Msg, Cite TWX 02-022, to Comdr AFBMD, 141757Z Feb 58.

217. Memo, WDGE/Col J. L. Hamilton, for Col Terhune and Dr. Ramo, subj: ARDC Ad Hoc Committee on Geophysical Support Requirements, 14 Feb 58.

218. Ltr, MCPT/BrigGen Ben I Funk, for Gen Schriever, subj: Air Force policy Governing R-W, 14 Feb 58, w/2 Incls: (1) MCPT Memo for Gen Schriever, subj: R-W Role with Respect to WS 117L, 14 Feb 58; (2) Draft Ltr to Secy of AF, subj: The Ramo-Wooldridge Corp.

219. Memo (S), WDTR/Col Charles H. Terhune, Jr., to Gen Schriever, subj: Programming for WS 117L, 17 Feb 58.

220. Ltr (C), The Ramo-Wooldridge Corporation/R. F. Mettler, to Col C. H. Terhune, Jr., subj: Thor/117L Discussions at AFMTC, 19 Feb 58.

221. Memo (S), SAFRD/Richard E. Horner, for the Secretary of Defense, no subj, 21 Feb 58.

222. Memo (C), Under Secretary Malcolm A. MacIntyre, for the Director of Guided Missiles, OSD, no subj: 21 Feb 58.

223. Memo (C), SOD/Neil McElroy, for the Secy of the AF, subj: Air Force WS-117L Program (Reconnaissance System), 24 Feb 58.

224. Msg (C), from WDTI-2-18-E, to Comdr ARDC, 25 Feb 58.

225. Msg (C), AFCVC 56978 to Comdr ARDC, info Comdr AFBMD, 262034Z Feb 58, quoting AFCGM msg 56082 dated 3 Feb 58.

226. Memo (C), OSD/Roy W. Johnson, Dir, ARPA, for the Secretary of the Air Force, subj: Reconnaissance Satellites and Manned Space Exploration, 28 Feb 58.

227. MFR, WDGE, subj: Call from General McCrokle, 28 Feb 58.

228. Memo (C), WDTR/Col Frederic C. E. Oder, to Col Terhune, subj: Differences between 117L Thor and Atlas Launched Programs, 3 Mar 58.

229. Msg (C), Cite AFCVC 57197, 032022Z Mar 58.

230. Memo, Hq USAF CofS/MajGen Jacob E. Smart, for Distribution, subj: Space Projects Involving ICBM/IRBM Components, 4 Mar 58.

231. Msg (C), Cite TWX 03-014, 051625Z Mar 58, quoting Memo for the Secy of AF, 28 Feb 58.

232. Teleconference (C), regarding requirements of Johnson memo of 28 Feb, subj:Reconnaissance Satellites and Manned Space Exploration, and AFCVC 57197, 3 Mar 58 msg.

233. Msg (C), Cite RDZGW-2-7-E, 8 Mar 58.

234. Msg (C), Cite AFCGM 57767, 10 Mar 58.

235. Memo (C), Under Secy AF M. C. MacIntyre, for Director Advanced Research Project Agency, subj: WS 117L, 19 Mar 58.

236. Ltr (C), DOD Armed Forces Policy Council, to Members of the Armed Forces Policy Council, subj: Publicity on ARPA Projects and New Missile and Satellite Developments, 19 Mar 58.

237. Memo (C), AF Under Secy Malcolm A. MacIntyre, for Director ARPA, subj: WS 117L, 19 Mar 58.

238. Msg (C), AFCTC 57197, 23 Mar 58, reference Msg AFCVC 56978 dtd 26 Feb 58.

239. Memo, The White House, Dwight Eisenhower, for the Secretary of Defense, 24 Mar 58.

240. Ltr, WDP/BrigGen O. J. Ritland, to CofS USAF, subj: Transmittal of WS 117L Development Plan, 25 Mar 58.

241. DOD News Release, subj: Secretary McElroy Announces New Space Programs, 27 Mar 58.

242. Memo, WDGM/LtCol Donald L. Perry, for Gen Schriever, subj: Message from SAFIS, 1 Apr 58.

243. Msg (C), Cite AFCGM 59270, 092119Z Apr 58.

244. 1st Ind, WDTSR, 15 Apr 58, to Ltr AFOOP-OC-R, Hq USAF, 2 Jan 58, subj: POC for ARS.

245. Memo, ARPA, for the Commanding General, Ballistic Missile Div, ARDC, subj: Presidential Approval of ARPA Projects, 17 Apr 58.

246. Ltr (C), WDTSR/BrigGen O. J. Ritland, to Asst CofS for Guided Missiles, Hq USAF, subj: Reduced FY 59 Program for WS 117L, 21 Apr 58.

247. Msg (C), Cite AFCVC 50190, 292128Z Apr 58.

248. Msg, Cite RDGPP-5-1-E, 061959Z May 58.

249. Msg (C), WDP-5-2, to CofS Hq USAF, info Comdr ARDC, 14 May 58.

250. Msg (C), WDP-5-3, to CofS Hq USAF, info Comdr ARDC, 14 May 58.

251. Msg (C), Cite TWX 05-15-01, 151450Z May 58.

252. DOD Directive No. 3200.5, subj: Assignment of Advanced Research Projects to the Advanced Research Projects Agency, 19 May 58.

253. Memo, AFCGM, for Distribution, subj: FY 1959 Revised WS 117L Development Plan, 22 May 58.

254. Msg (C), Cite AFCGM 51207, 231401Z May 58.

255. Msg RDZGW 6-1-58, 041700Z Jun 58.

256. Msg (C), WDGO-6-2, 10 Jun 58.

257. Memo (C), USAF Under Secretary Malcolm A. MacIntyre, for the Director, ARPA, 12 Jun 58.

258. Ltr, ARDC/LtGen S. E. Anderson, to MajGen B. A. Schriever, 13 Jun 58.

259. Memo (C), ARPA/Roy W. Johnson, Director, for the Secretary of the Air Force, subj: Military Reconnaissance Satellite Progress Report, 18 Jun 58.

260. Memo (C), Office of The Under Secretary, DAF, for the Chief of Staff, no subj: 24 Jun 58.

261. ARPA Prder No. 9-58 (C), ARPA to CG, BMD, no subj, 30 Jun 58. (Amendments 1 to 6 are contained in these volumes; Amendments 7, 16 Feb 1959 to 16 dated 3 Dec 1959 are contained in 1st Volumn of SAMOS Documents).

262. Draft Report, Comments on Space, 30 Jun 58.

263. Memo, WDTWI/LtCol Richard K. Jacobson, for Col Terhune, subj: Douglas-Lockheed Relationships in WS-117L, 3 Jul 58.

264. Minutes of Twentieth Meeting AFBMC (C), 8 Jul 58.

265. Ltr, Hq USAF/BrigGen H. A. Boushey, to Comdr AFBMD, subj: Progress Reports, WS-117L, 10 Jul 58.

266. Memo (C), ARPA/Roy W. Johnson, for the Commanding General, Ballistic Missile Division /AFBMD/; subj: Military Reconnaissance Satellite Report, 15 Jul 58.

267. ARPA Order No. 9-58 Amendment No. 1, 17 Jul 58.

268. Memo, WDTX/Col Lawrence D. Ely, for Gen Ritland, subj: Status of Reply to ARPA Order 9-58, 18 Jul 58.

269. Memo (C), ARPA/Roy W. Johnson, for the Secretary of the Air Force, subj: WS-117L Development Plan, 29 Jul 58.

270. ARPA Order No. 9-58 Amendment No. 2, 4 Aug 58.

271. ARPA Order No. 14-59, 15 Aug 58.

272. Msg (C), WDTSR 8-15-E, 18 Aug 58.

273. SO No. M-770 ARDC 22 Aug 58.

274. ARPA Order No. 9-58 Amendment No. 3, 25 Aug 58.

275. Msg (C), Cite AFCGM 56504, 281937ZE Aug 58.

276. Ltr, ARDC/LtGen S. E. Anderson, to Gen Curtis E. Lemay, VCofS, Hq USAF, no subj, 26 Aug 58, w/2 Incls: (1) Chart reflecting new organization for AFBMD; (2) Chart showing new Military Space organization in detail.

277. Ltr, Hq USAF/MajGen Arno H. Luehman, Director of Information, to Comdr AFBMD thru Comdr ARDC, subj: Classification of Information on WS-117L, 29 Aug 58.

278. Memo (C), ARPA/Roy W. Johnson, for Comdr AFBMD, subj: Large Booster for Future Space Projects, 3 Sep 58.

279. Msg (C), RDZGW-9-6-E, 041800Z Sep 58.

280. Memo (C), ARPA/Roy W. Johnson, for Comdr AFBMD, subj: Redefinition of WS 117L, 10 Sep 58.

281. Memo, WDSPR/MajGen B. A. Schriever, to Generals Funk and Large, Dr. Ramo, All Personnel, AFBMD, subj: Announcement of AFBMD Internal Reorganization, 12 Sep 58.

282. Msg (C), Cite AFCGM 57155, 122033Z Sep 58.

283. Memo, WDGPR/BrigGen O. J. Ritland, for Generals Funk and Large, Dr. Ramo, All Personnel, AFBMD, subj: Organizational Announcement, Organization of the Deputy Commander Military Space Systems, AFBMD, 16 Sep 58.

284. Msg (C), Cite 3347, 2322072Z Sep 58.

285. Memo, ARPA/Roy W. Johnson, for the Comdr BMD, subj: ARPA Ad Hoc Group on Project Sentry and Follow-on Program, 25 Sep 58.

286. ARPA Order No. 9-58 Amendment No. 4, 25 Sep 58.

287. GOR No. 80 (C), title (C), General Operational Requirement for a Reconnaissance Satellite Weapon System, 26 Sep 58; GOR 80-1, same title, same date; GOR 80-2, same title, same date; GOR 80-3, same title, same date; GOR 80-3a (C), title: Amendment to a GOR, 9 Feb 59, later cancelled by SOR 209, 28 Jan 64 (see MIDAS docs); GOR 80-4, same title, same date as basic GOR:

288. ARPA Prder No. 9-58 Amendment No. 5, 29 Sep 58.

289. Ltr (C), WDZ/MajGen B. A. Schriever, to Mr. Roy Johnson, Director, ARPA, no subj, 9 Oct 58.

290. Ltr (C), WDZW/MajGen B. A. Schriever, to Mr. Roy Johnson, Director, ARPA, no subj, 9 Oct 58, w/1 INCL: FY 59-60 Adv Mil Space Sys Cost Schedule.

291. MFR (C), WDZW/Col Frederic C. E. Oder, subj: Review by ARPA Ad Hoc Committee of the 15 September 1958 WS 117L (SENTRY) Development Plan and Related Actions During the Period 30 September-3 October, 15 Oct 58.

292. Ltr, WDZW/MajGen B. A. Schriever, to Comdr ARDC, subj: Re-definition of WS 117L, 16 Oct 58.

293. Ltr (C), ARPA/Roy W. Johnson, to General Schriever, no subj, 20 Oct 58.

294. Minutes of Twenty-Fourth Meeting AFBMC (C), 20 Oct 58.

295. Msg, RDZGW-10-3, 232010Z Oct 58.

296. Msg (C), AFABF 50054, 241623Z Oct 58.

297. Memo (C), AF Under Secretary Malcolm A. MacIntyre, for the Director of ARPA, subj: FY '59 117L Program, 17 Nov 58.

298. Memo, MajGen B. A. Schriever, for Colonels Terhune and Curtin, subj: Atlas Program Over-Commitment, 20 Nov 58.

299. Msg (C), Comdr AFBMD (WDZW) to CofS Hq USAF, info Comdr ARDC, 240255Z Nov 58.

300. Msg (C), Comdr AFBMD (WDO-12-1), to OSD ARPA, info CofS Hq USAF and Comdr ARDC, 041735 Dec 58.

301. Memo (C), ARDC/Roy W. Johnson, for the Secretary of the Air Force, subj: WS-117L Program, 4 Dec 58.

302. Memo (C), ARDC/Roy W. Johnson, for The Under Secretary of the Air Force, subj: DISCOVERER-THOR Project and SENTRY Programs, 5 Dec 58.

303. Msg (C), OSD ARPA to Comdr AFBMD, info Comdr ARDC, 092108Z Dec 58.

304. ARPA Order No. 9-58 Amendment No. 6, 11 Dec 58.

305. Memo (C), WDZ, for Asst Deputy Commander for Weapon Systems, Electronics, subj: Surveillance Requirements, 18 Dec 58.

306. Memo (C), ARPA/Rear Adm (USN) John E. Clark, Acting Director, for Comdr AFBMD, Subj: Format for the December 31, 1958 Military Satellite Program Progress Report, 23 Dec 58.

~~307. Msg (C), AFDAT 54519, 30 Dec 58.~~

308. Charts (C), title: Sentry Flight Test Vehicle Production Program IIA, 2 each, 31 Dec 58.

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117L file

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EVALUATION CRITERIA

The attached evaluation criteria follow the same basic pattern of the Prime Contractor evaluation of the Pied Piper studies which resulted in the WS 117L program. They are divided into the same three main groups, but the actual criteria have in part been modified to better fit the job at hand:

A. Technical Evaluation

B. Development and Production Aspects

C. System Management Potential

It is considered essential that certain of these criteria must be affirmatively satisfied for the potential source to be considered a competitor. Hence, screening of all possible sources will be accomplished by a kind of "go" or "no go" process comparison against the essential criteria or factors.

TECHNICAL

Criteria for Choosing Contractor

Prime:

1. The integrating aspect of subsystem I is the method to be employed within the subsystem of marking, indexing, storing, retrieving, and disseminating both numerical type information (e.g., targeting) and "intelligence-like" data (photo interpretation notes, target descriptive data, etc.). Prime Contractor should have up-to-date knowledge and capability in this area. This knowledge must include complete over-all understanding of the organization and operation of the AF intelligence community and its relationships with other agencies, in addition to working knowledge of source of raw data and uses of produced data at all echelons.

2. Prime Contractor should have inherently, or readily available, a capability to effectively accomplish design, top knowledge related thereto, and monitor and merge capabilities in the following areas:

Scientific

Electronics) Electro-
Optics) Optical
Sensitometric
Documentation
(Info-organizing)
Geodesy

Application Fields

Photogrammetry and
Dimensional Cartography
Systems Analysis (Quant & Qual)
Flint Data Handling(Collection)
Communications
System Design (of above)
Display Technology

Operations

Photo-Lab
Electronic Maint.
Mech. and Optic Maint.
Computer Prog.
Photo-interpretation

3. Prime Contractor must demonstrate understanding of problem through projection of uses of the collected data in the time period of operational use.

a. Certainly many of present functions will be in the obsolescence phase with air breathing and ballistic missile type targeting problems being paramount.

b. The likely contribution to the warning problem while at first may be small should be recognized realistically and provided for in the system design.

c. Of great importance is the understanding of how the ARS data can be correlated and used to support and direct programming of other collection systems and how the collected products can best become mutually supporting to provide the most efficient use of all data.

4. Intelligence know-how, systems design experience, system development management, facility operation management are desireable experiences for the particular prime contractor team. Technical and managerial competence of team.

5. Prime Contractor must recognize in detail and be responsive to the two interface areas of this system — one with the collection system and certain of its subsystems, which will entail much close liaison with the other prime contractor for the system, and the other with system 438L or some similar system which, in general is involved with improvements in the over-all intelligence system. To accomplish this part of the problem, certainly the technical ability to understand the design and development problem of the other part of WS 117L and 438L is required, however, in addition the quality of intellectual honesty, cooperation, objectivity, flexibility and the ability to work well with others is of at least equal importance.

Development and Production Aspects

1. System Management Approach
2. Assignment of enthusiastic experienced high calibre personnel
3. Pledge of top level corporate emphasis on program
4. Master Plan
    a. Program Cost
    b. Labor Requirements
    c. Facility Requirements

Prime Contractor must have demonstrated ability to make and meet funding and time estimate in his projected programming. This implies a prime contractor of excellent integrity.

5. Amount of Subcontract effort -- strength of likely subcontractors.

Prime Contractor must have willingness to supplement design and development capability with subcontractor effort, since no existing single contractor has unique self contained capability for the diverse problem of this subsystem.

System Management Potential

1. Provide best over-all understanding of and approach to the problem of designing, developing, producing and operationally testing an efficient system to handle the WS 117L collected data most reliably to satisfy intelligence of the period users and matched in time to the collection capability of the system, quantity, quality and type of sensed data. In addition the ARS system must be capable of and actually meshed with the existing intelligence system of the period, whether it be 438L or just improved versions of the current system.

a. Contractor Philosophies — Program Adequacy:

(1) Knowledge of basic intelligence needs and objectives projected to use period

(2) Knowledge of projected weapon types, capabilities and info needs

(3) Since (1) and (2) are dynamic, design must express flexibility of thought, initiative, and span of purpose.

(4) Knowledge of intelligence user requirements and national and technical environment affecting these.

b. Interference With (or From) Other Programs

Extent of Scientific and Technological effort in many different and frequently unrelated areas which will be required for the successful prosecution of S.S.I. This places a premium on systems management of a high order and a degree of scientific versatility which is rare.

(1) Ability to function as a tightly-knit systems management team. ("first team" availability)

(2) Prime Contractor should stand prepared to organize exclusively

for the system design and facility management of this subsystem.

c. Motivations and Contractor Relationships

(1) Why is contractor interested in participating?

  (a) $

  (b) Prestige

  (c) Sincere belief in program importance

(2) Interest to cooperate in every possible way with AF

(3) Establish good reputation in the D/N field.

(4) Responsive attitude and flexibility and willingness to accept AF direction.

d. Operational System Test Plan

(1) Over-all test philosophy

(2) Early testing of parts of the system and of the system as a whole through modeling a simulation.

(3) CPX's prior to operation to checkout saturation level points and reaction of system when saturated

(4) Personnel training test bed (?)

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WDTR

MEMORANDUM FOR General Ritland

SUBJECT: ARS Contract Work Statement Definitization Meetings

ARDC Repr

1. I believe that Colonel Norton has spoken to you informally in a request for you to give the lead-off talk at the above series of conferences. The initial conference, which will commence at 1000, Tuesday, 15 January 1957, will be attended by approximately 30 representatives from the ARDC Centers and will be held in Room 218, Bldg 5.

Purpose

2. The purpose of calling all of these representatives together is to assist the WS 117L Project Office in writing the definitive work statements for the contracts with Lockheed Aircraft Corporation and Massachusetts Institute of Technology for the ARS. In addition, and closely related to this, will be the preparation of detailed plans for the subsystem projects of WS 117L.

3. The Center representatives who will attend are those who have been participating in the past as technical advisors in the ARS Program. For the purpose of this series of conferences, they have been furnished appropriate material generated by the WS 117L Project Office and LAC.

Procedure

4. As soon as the whole group has been given its instructions as to the end product desired it will be broken up into working groups, one for each of the subsystems concerned. Each of these working groups will be chaired by the appropriate subsystem project officer from WDTR. Once these subsystem project plans and definitive work statements have been drafted up by the working groups, they will be reviewed by WDTR, and subsequent meetings will be arranged between WDTR plus a few of the Center representatives with LAC representatives to come to agreement on the work statement of the contract. All of this of course is necessary before the actual definitive contract negotiations can be entered into between the AF and LAC as well as the AF and MIT.

5. By way of philosophy, the entire group will be reminded that in any system development activity, there is a logical spectrum of activity from the study phase to a specific engineering description of the end product. Colonel Oder will point out to the group just where we stand on the ARS system in regard to this spectrum at the present time, and will ask the group to use engineering and management judgement in attempting to describe the end product to the degree necessary to write a good contract while bearing in mind that as we proceed we will undoubtedly have to amend our goals.

6. In view of the not inconsiderable support that the ARS project has enjoyed from ARDC Centers in the past, I think it quite appropriate that WDD show them by your participation at the initial session the importance that we attach to the proper management of this system.

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Technical Operations

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Sincerely,

SIGNED
O. J. RITLAND
Brig. Gen., USAF
Vice Commander

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WDTR

MEMORANDUM TO: WDTX

JAN 25 1957

SUBJECT: Major Events of CY 1956 for WS 117L

1. In accordance with instructions furnished at the WDT Staff Meeting, 15 January 1957, herewith are a listing of events concerning WS 117L which should be transmitted to the Historian, WDD:

a. In the early months of 1956, the Weapon System Project Office for WS 117L was formed at WDD using as a nucleus officers transferred from Detachment 1, Headquarters ARDC, Wright-Patterson Air Force Base, who had previously been associated with the program. Western Development Division had been assigned responsibility for the WS 117L Program in accordance with the authority contained in SR 5, Headquarters ARDC, dated 17 October 1955. ✓

b. Under the authority of WDD Special Orders No. 6 dated 5 March 1956 a Contractor Evaluation Board was established. Members of the board were:

Colonel William H. Baynes, HERARDC, President
Lt Colonel R. C. Holub, HERAMC
Commander R. C. Truax, WDD
Lt Colonel W. G. King, Jr., WADC
Lt Colonel V. M. Gene~~z~~ HEDARDC
1/Lieutenant R. S. Washburn, HEDAMC
Mr. R. S. Blocker, HEDAMC

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The board convened at WPAFB during the period 12 - 20 March 1956 and submitted its report and recommendations to the Commander WDD on 20 March 1956.

c. Following the recommendations of the contractor selection board, which were approved by Hq. ARDC and Hq. USAF, representatives of the ARDC Centers together with the WDD staff met to prepare the initial Development Plan for WS 117L. This was completed on 2 April 1956, and submitted by Commander WDD thru Commander ARDC to Hq. USAF. Simultaneously, a series of presentations covering material contained in the Development Plan were given to the Commander ARDC and to the DCS/D, Hq. USAF. These briefings culminated with a presentation to the Honorable Donald A. Quarles, Secretary of the Air Force on 10 May 1956.

d. On 13 July 1956, a special presentation on WS 117L with particular reference to technically difficult subsystems and components of the over-all system was made by a WDD team headed by Brigadier General O. J. Ritland to the President's Science Advisory Committee,

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which is constituted under the Office of Defense Mobilization. Subsequently, a letter which favorably accepted the proposed system from the Chairman of the committee, Dr. I. Rabi to the Defense Mobilizer, the Honorable Arthur Flemming.

e. On 3 August 1956, Development Directive 85 was issued by Hq. USAF approving the development of the ARS. This was followed by Systems Development Directive No. 117L, 17 August 1956, issued by Hq. ARDC. These documents made available an initial funding of three million dollars ($3,000,000) in P-600 funds.

~~have amend #3 dtd June 58~~

f. During the ensuing period, requests for additional funds were sent thru Hq. ARDC to DCS/D Hq. USAF resulting ultimately in the commitment of ten million dollars ($10,000,000) in P-600 funds plus an as yet unspecified amount in P-100 and P-200 funds for the ARS Program for FY 1957.

g. On 5 November 1956, the prime system's contract for the development of WS 117L was let between the Air Force and the Lockheed Aircraft Corporation. The LAC had been the contractor recommended by the Contractor Evaluation Board referred to previously.

h. As of the end of the year, the Project Office consisted of 10 officers and 3 civilians. Lieutenant Colonel Frederic C. E. Oder, 7684A, was the Assistant for WS 117L, Technical Operations, WDD, and as such, Chief of the Weapon System Project Office, having succeeded Colonel O. J. Glasser in this capacity as of 13 August 1956.

2. In the event that further information is required, it is requested that the Historian, WDD, contact WDTR directly.

Frederic E. Oder
FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations

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WDTR

30 Jan 57

SUBJECT: Planning and Funding Requirements for WS 117L

THRU:
Commander
Air Research and Development Command
ATTN: RDZG
Post Office Box 1395
Baltimore, Maryland

TO:
Deputy Chief of Staff, Development
Headquarters USAF
Washington 25, D. C.

1. In your letter dated 10 December 1956, (U) Requirement for Additional FY 1957 Funds for WS 117L to the Commander, Air Research and Development Command, guidance is furnished for the planning of the Advanced Reconnaissance System Program. While this guidance will be reflected in a revision to the WS 117L Development Plan now in preparation, there are certain aspects of the problem which should be brought to your attention at this time.

2. I have interpreted your guidance that we should not plan to launch this system prior to FY 1961 to mean that a satellite with a military reconnaissance capability not be launched on an operationally useful orbit until that date. In view of the extensive development and test which must procede such an event, this guidance is not considered to be restrictive at the present time.

3. Realizing the P-600 funding problems that must be considered during FY 1958, the need for establishing ceilings in this fund area is understandable. These P-600 funds cited in your letter are, however, inadequate to meet the minimum component development and test needs of this program. Both Secretary Quarles and you have pointed out the magnitude of the development program associated with this system, and have recognized that it utilizes a new mode of transportation and requires many new features in its reconnaissance and data link equipment.

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4. An FY 1958 Financial Plan for WS 117L which is based upon a ten million dollar ($10,000,000) program in P-600 funds is Inclosure 1. Inclosure 2 states those goals which we can reach and those which cannot be reached. This level of funding will cause serious slippage in the achievement of certain of the reconnaissance capability of the system, particularly in the ferret and infra-red areas.

5. Facilities required are computed upon the basis of new construction and total four million five hundred thousand dollars ($4,500,000) in P-300 funds (Inclosure 4). Every attempt will be made to utilize existing and available facilities with a corresponding reduction in new construction cost. Inclosure 3 points out the need for authority to commence A and E work for a number of these facilities during FY 1957. Early approval of the A and E work is requested.

6. The test schedule (Inclosure 5) is attainable but our ability to develop components for testing is directly related to the funds available.

7. Western Development Division has been informally advised that there is presently no line item for WS 117L in the FY 1958 P-100 and P-200 budgets. An FY 1958 budget estimate for WS 117L (Inclosure 6) was submitted by TWX(SECRET) WDTR 7-3-S-E, 19 July 1956, to Headquarters ARDC. Information received from Headquarters ARDC indicates that this budget estimate was contained in a letter from Commander ARDC to the Director of Budget, Headquarters USAF, 23 August 1956, "FY 1958 Budget Estimate for Systems."

8. To permit an orderly management of the ARS program, urgent action is requested in regard to our letter, 21 November 1956, "Fund Requirements for WS 117L Program."

a\. Lack of FY 57 P-100 and P-200 funds is preventing procurement of material and equipment essential to maintaining a balanced system oriented program.

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b. FY 57 funds to cover procurement of the four (4) SM 65 boosters are still a very valid requirement and are not affected by the guidance contained in your letter. The lead time for procurement, assembly and check-out of the boosters and the WS 117L test items dictates that these funds be available to Western Development Division no later than February 1957.

6 Incl
- 1-WS 117L FY 58 Fin Plan 1 pg, 2 cys WDTR 57-13
- 2-Justifi for WS 117L Budget, FY 58, 7 pgs
- 3-FY 58 P-300 Fin Plan 1 pg, 2 cys WDTR 57-13
- ④-Form 161, 12 pgs, 2 cys WDI 56-220
- 5-Flight Test Schedule 1 pg, 2 cys WDTR 57-13
- 6-Summary of TWX of 19 Jul 56 (WDTR 7-3-S-E) 1 pg, 2 cys WDTR 57-13

/S/ B. A. Schriever
B. A. SCHRIEVER
Major General, USAF
Commander

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WDTR, WDD, 30 Jan 57, Subj: (U) Planning and Funding Requirements for WS 117L

RDZGW

1st Ind 5 Feb 57

HEADQUARTERS, AIR RESEARCH AND DEVELOPMENT COMMAND, Post Office Box 1395, Baltimore 3, Maryland

TO: Deputy Chief of Staff, Development, Headquarters USAF, Washington 25, D. C.

1. This Command recognizes the limitations imposed in your letter, subject; (U) Requirement for Additional FY 1957 Funds for WS 117L, dated 10 December 1956, as restricting the P-600 funding for WS 117L to $10,000,000 in FY 1958. In order to maintain the proper balance between component development, fabrication, and testing for WS 117L, as directed by the Secretary of the Air Force, it is strongly urged that every effort be made to obtain P-100, 200, and 300 funds for FY 1957 and FY 1958 in the amounts indicated by the Western Development Division. ~~(SECRET)~~

2. The data contained in the inclosures to the basic letter are intended to provide members of your staff with the most up-to-date information regarding our plan for conducting the WS 117L development in accordance with the guidance we have received. (Unclassified)

6 Incls
n/c (1 cy ea)

SIGNED
DON R. OSTRANDER
Brigadier General, USAF
Assistant for Guided Missiles Systems
Deputy Commander/Weapon Systems

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WS 117L FY 58 Financial Plan

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Budget Program WS 117L Total (Million $)	P-100	P-200	P-300	P-[illegible]	Total
	19.870	12.490	4.520*	10.000**	46.883
Sub-systems					
A. Vehicle	3.800	0.950		2.000	6.750
B. Propulsion	4.000	1.150		-----	5.150
C. Auxiliary Power	0.450	0.800		0.500	1.750
D. Guidance and Control	1.300	0.400		1.500	3.200
E. Visual Reconnaissance	0.200	0.400		2.000	2.600
F. Electronic Reconnaissance	-----	0.250		0.100	0.350
G. Infra-red Reconnaissance	-----	0.250		0.100	0.350
H. Ground Space Communications	1.900	4.250		3.100	9.250
I. Data Processing	-----	2.000		0.500	2.500
J. CPRL	-----	-----		-----	-----
K. Geophysics	0.750	-----		0.200	0.950
L. Boosters	7.470	1.960		-----	9.430
Facilities			4.520		4.520

* See P-300 financial plan for details.

** Includes the efforts at the ARDC Center in Sub-systems B, C, D, I and K. Complete justification of how the funds in each of these areas are to be used in Inclosure 2.

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JUSTIFICATION FOR WS 117L BUDGET
FY 1958

304

A. SYSTEM

I. The flight test schedule which is keyed to progress expected in the system development is that shown on Inclosure 5. Whether this schedule could be realized or not would depend in a large degree to the funding provided in both FY 57 and FY 58. While this schedule represents a stretchout over that approved in the WS 117L Development Plan of 2 April 1956, earlier flights are proposed. These earlier flights are based on an estimated improvement in the availability of SM 65 missiles to the WS 117L program, and are required to gain the earliest possible information on the several unknowns relating to the design of the ARS vehicle and to the environment under which many of the subsystems will have to operate. The results obtained with these three (3) flights could have a very great impact on the design of the system and would minimize the possibility of expending funds unnecessarily on unprofitable approaches. The flight test schedule represents a fifty per cent (50) reduction in the number of flights compared to that shown on the 2 April 1956 Development Plan. Adhering to the ceiling specified in DCS/D letter of 10 December, cuts have been made in the following order:

a. Those areas that control the quantity of information put out by the system.

b. Those areas that affect the operational economy of the system after it is developed.

c. Those areas that affect the quality of the information provided by the system.

Overriding emphasis will be placed on the pioneer visual capability and work on other capabilities reduced to a study and component-test level. The operational data for the visual system capable of a high data rate will be postponed by about two (2) years over the Development Plan of 2 April 1956. A tabulation of FY 58 fund requirements is contained in Inclosure 1.

B. SUBSYSTEMS

I. Vehicle. Two million dollars ($2,000,000) of P-600 funds are allocated to this subsystem. This, together with those FY 1957 funds allocated to this subsystem will be spent for design and initial testing of the pioneer visual vehicle. The funds will cover, in a marginal fashion, the development of the tankage which constitutes the hard core of the vehicle and the skin and fairings for this vehicle. The funds will also cover design and fabrication of prototype of vehicle ground servicing equipment. No work will be done on the advanced vehicle. It has been determined that such an advanced vehicle would permit a forty per cent (40%) increase in payload that would amortize development costs in about

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one year of operation, thus, every year's delay in initiating development of the advanced vehicle with its associated propulsion system will result in incurring additional operational costs roughly equal to the development costs for the advanced vehicle.

The ground test program for the vehicle and propulsion system will have to be curtailed sharply. This will result in a lower vehicle reliability. Since the cost of each launching is in the neighborhood of four million dollars ($4,000,000), short range economy in this area also carries a definite possibility of long range waste of funds.

Only design studies will be made on the ferret and infra-red vehicle configuration.

A total of 11.3 million dollars of P-100 money is required in the vehicle program. Of this amount, $3.8 million is required for the procurement of ground and flight test orbital vehicles, and 7.5 million for the procurement of four (4) SM 65 boosters. This is based on the assumption that four (4) boosters are funded in FY 57 in accordance with current requests. If fewer than four boosters are funded in FY 57, the difference must be made up in FY 58 if the schedule is to be maintained. Current booster lead time requirement is approximately 22 months in advance of flight date. 2.9 million P-200 funds will be required for the purchase of servicing equipment, checkout consoles, specialized automotive vehicles, erection equipment and other items for the support of the vehicle ground and flight test program.

II. Propulsion. No P-600 funds will be allocated under this budget to propulsion in FY 58. This is based on the assumption that the engine will be brought to an acceptable state of reliability by the approximate 1.7 million dollars of P-600 funds allocated to the powerplant out of the FY 57 budget. If unforeseen development problems arise in FY 58, the program will be in difficulties.

It is hoped that any modification of the engine selected that may be required during FY 58 will be of such a nature as to be chargeable against P-100 funds. A total of 4 million dollars in this category is requested. Development of an injector plate to give improved performance has been financed partially under the Vanguard program, and is expected to be completed by FY 57 funding under the WS 117L program. A portion of the P-100 funds stated above will be expended in the modification of the Vanguard engine to accept this new injector plate and in the qualification testing of the engine with this modified injector. The above amount also includes funds for the purchase of four (4) ground test engines and five (5) flight rated engines, including acceptance testing of the powerplants prior to delivery.

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1.15 million dollars of P-200 funds are required for ground equipment for testing the propulsion subsystem, both at the contractor's plant and at the flight test base.

The above program will permit no support to be given to the development of an advanced engine for the advanced vehicle.

III. Auxiliary Power Supply. The allocation of 0.5 million dollars of P-600 funds to the auxiliary power supply will be sufficient to accomplish the research and development work required for the primary batteries for the pioneer vehicle and the storage batteries to be used in conjunction with the radioisotope and solar power supplies. It is expected that the reactor and the radioisotope power supply development will be financed in toto by the Atomic Energy Commission, and therefore, the progress in these areas would only be indirectly affected by the allocation of funds within the WS 117L program. With the allocation proposed, work on the solar power supply will be carried on only at the component research level and no system development will be possible. This approach to providing electric power is the most attractive of all from an operational point of view in that it has potentially unlimited life and does not give off radiations that constitute a hazard either to personnel or to the film used in the visual reconnaissance version. Curtailment of work on this approach increases the possibility that no power supply of extended life will be developed which is compatible with the visual system. Should this be the case, continued dependence on batteries will be required with the resultant higher operating cost. With the funding proposed, no work will be possible on a chemical auxiliary power supply.

0.45 million of P-100 money in this subsystem is required for the purchase of batteries for ground and flight test work.

The 0.8 million dollars in P-200 funds is required to finance the purchase of reactor power conversion test equipment, including simulated reactor heat source, mercury and sodium test rigs, heat exchangers, turbo-machinery, pumps and controls and other ground test equipment required to test and evaluate the equipment to be produced under the AEC funded programs.

IV. Guidance and Control. A total of 1.5 million dollars of P-600 funds has been allocated to the guidance and control subsystems. These funds will be devoted towards continuing the design and development work on the ascent guidance system (based on the use of the inertial platform being developed under the IRBM program), the autopilot for the orbiting nose cone, the orbital stabilization system, and the guidance computer. No design or development work will be possible on the light weight

"Skipper" ascent guidance platform. This latter approach promises a weight saving of about 300 pounds which could be converted to payload, or a simplification of the system which would give higher ultimate reliability and increased accuracy. This increase in accuracy would be reflected in more precise locations of reconnaissance points, and in improved resolution due to improved image motion compensation.

The 1.3 million dollars of P-100 funds will be for the purchase of four (4) ascent guidance units, four (4) transition computers, four (4) orbital stage autopilots.

The 0.712 million dollars of P-200 funds shown in the breakdown for the guidance and control subsystem would be spent for ground equipment for the calibration and checkout of the inertial platform and for simulators to test the guidance and control equipment.

V. Visual Subsystem. It is estimated that approximately two million dollars ($2,000,000) of P-600 money would be allocated to the Visual Reconnaissance Subsystem under this budget. This amount will limit the approach to a single preselected effort. Development will be concentrated on a strip film camera having approximately 6 inch focal length, an airborne film processor and the kinescope type of readout equipment using a flying spot scanner. Technical details of this equipment would be substantially as described in the Development Plan of 2 April 1956. Little or no work will be done on the high resolution system, embodying the 36 inch focal length lens, on improved films, particularly those compatible with nuclear radiations, on television type read-in systems, on electrostatic tape, or other types of recording systems. The television system promises greatest compatibility with the reactor power supply. The reactor type of power supply is that which at the present moment, at least, offers the greatest assurance of success. The reduction of funds in this area to the amount stated above will increase the risk of having no visual system available which is compatible with the reactor type of power supply. This would increase the dependence on short life battery powered photographing systems for at least an additional year of operation. Such systems would require expenditure of from 5 to 10 times as many vehicles as those using long endurance solar or nuclear electric power to accomplish the same reconnaissance mission. This, of course, would result in increased operational costs in the event that it was found necessary to go into extensive operational use of the battery powered vehicles.

0.2 million dollars of P-100 funds will be required for the purchase of three (3) test models of visual equipment beyond the prototype model for test on the ground, in aircraft, balloons and for component flights in early vehicles.

0.48 million dollars of P-300 funds will be required for the procurement of specialized ground readout, photo processing and test equipment.

VI. Ferret Subsystem. Approximately one hundred thousand dollars ($100,000) of P-600 funds will be allocated to the electronic reconnaissance subsystem. This amount of money will limit development work on this subsystem to requirement study, design and ground test of modified standard components.

0.25 million dollars of P-300 funds will be required for the procurement of ground test equipment and ground simulation equipment for the establishment of the proper ground environment for testing of the components modified under the above paragraph.

VII. Infra-red Subsystem. Under this budget program only one hundred thousand dollars of P-600 funds can be allocated to the infra-red subsystem. Work in this area will have to be reduced to the determination of target emission characteristics when viewed from high altitudes, and to laboratory tests of sensing elements.

No P-100 funds will be allocated during FY 1958.

Two hundred fifty thousand dollars ($250,000) of P-200 funds will be required for ground test equipment to support the program of development financed by the P-600 money.

VIII. Ground Space Communication. A total of 3.1 million dollars of P-600 funds will be allocated to this subsystem. This is one of the most difficult and complex subsystems, and will continue to receive a high proportion of the funds, but for the same reason will take the largest cut dollarwise. A number of different approaches are possible on a reduced cost basis. A definite decision among these approaches has not been made at the present time. All have definite technical drawbacks which will lead to reduced capability and higher ultimate cost. The cheapest approach to solution of the tracking problem is to use the Vanguard "Minitrack" system. This approach reduces the security of the system because of its dependence on foreign bases. "Minitrack" requires a greater number of revolutions of the satellite to obtain a given accuracy in orbit determination. During the R&D period this is a critical element, because of the possibility of vehicle failure before the orbit has been measured. Existing Minitrack stations are not well disposed for operational orbits.

The use of modified AN/MSQ-1 radar for tracking is the next cheapest solution. This avenue requires use of a high powered transponder in the vehicle which will constitute a heavy drain on the batteries and further shorten vehicle life.

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The best solution appears to be the nulling interferometer, but this approach requires the most R&D funds, takes the longest, and involves the greatest risk to success.

Adequate telemetry is a fixed requirement for any experimental flight test program and must be provided by any budget.

The ground data link for transmission of reconnaissance information is too expensive an item to be financed completely under any allocation of funds possible under the proposed ceiling. A considerable proportion of the allocation of the FY 58, none the less, will go into the initial phases of development of this particular equipment. The many environmental unknowns, however, dictate an early flight test program for visual systems components. The lack of sufficient funds for complete development of the data link means that initial flight tests of visual system components will have to be made using telemetered information alone. It is to be emphasized that this data link will only transmit functional data and not pictures. This will delay our obtaining quantitative information of the photographic quality which may be expected when all of the links are in the chain.

The eventual requirement is for a command type of programmer. Such a programmer will permit conservation of vehicle battery power in a reduction of the total system work load and duty factor by eliminating the scanning of areas which are not important from an intelligence standpoint. Under the proposed budget, it will be necessary to use an interim pre-set type of programmer. This will probably be adequate for R&D purposes but will certainly not be satisfactory from an operational point of view.

Approximately 1.9 million dollars in P-200 funds will be required for the purchase of standard airborne electronic components including telemetry, tracking beacon or transponder and other items of airborne electronics for the flight test program.

There is a comparatively heavy requirement of 4.25 million dollars of P-200 funds for the purchase of ground support equipment for the ground space communication subsystem. These funds will be expended almost entirely in the purchase of ground elements for the tracking and telemetry functions. The exact items of equipment will depend on which of the approaches discussed under the P-600 fund allocation is to be followed.

IX. Data Processing Subsystem. A total of only 0.5 million dollars of P-600 funds has been allocated to this subsystem in line with the policy of making good first in those areas which affect the quality rather than the quantity of the data produced. R&D work consequently on mechanical aids to permit exploiting the high intelligence producing capacity of the system will be limited to technique investigation. Hardware development

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will be delayed to subsequent years.

2.0 million dollars of P-200 funds are required to provide simulators and ground test equipment destined for use in subsequent years with an increased program of R&D on the actual data processing equipment itself. Certain standard items for the processing and cataloging of photographic films will be purchased for use in conjunction with the technique investigation previously mentioned.

X. Geophysics Project. 0.2 million dollars of P-600 funds are allocated to geophysical research on problems of environment relating to this weapon system. These funds will be expended in a design development and manufacture of test instrumentation, to gather environmental information. Because of the many unknown questions relating to the new environment under which this system must operate, it is considered essential that this information be obtained at the earliest possible date if it is to be of any use whatsoever in the design of equipment to follow.

0.75 million dollars of P-100 funds are being requested to provide for the purchase of items of flight test instrumentation beyond the prototypes, flight test instrumentation of a standard nature, and complete Aerobee-High or other similar sounding rocket vehicles for use in the geophysics program.

XI. CTRI. All effort will be suspended in this project unless additional FY 58 P-600 funds are made available.

FY 58 P-300 [redacted]an ~~CONFIDENTIAL~~

Facility	Estimated Lead Time Start Const To Opn'l	Need Date Activation Completed	Estimated Cost
[illegible]			
WS 107 Launcher modified for WS 117L	Oct - Dec 1957	Sep 1958	
[illegible] Hawaii Tracking and Telemetry Station	6 months	Sep 1958	
Blockhouse, Assy Bldg and Shop Space	Available facilities	Jun 1958	
*WS 107 Launch Facility at Cooke, Modified	Modifications accomplished	Sep 1959	
Blockhouse, Assy Bldg and Shop Space	During Const	Sep 1959	
Hawaii Tracking and Telemetry Station			
Ground Space Communications Bldg	14 months	Sep 1959	$ 606,000
Admin and Comm Bldg	14 months	Sep 1959	500,000
Power Plant		Sep 1959	210,000
**Misc Support	Less than 14 months	Sep 1959	2,000,000
AIS Intelligence Center			
*Ground Space Communications Bldg	14 months	Sep 1959	606,000
Launch Site - WS 117L Cooke			
*Ground Space Communications Bldg	14 months	Sep 1959	606,000
			$4,528,000

* It is assumed that the cost for these items will be funded for by AFMTC for those items at Patrick AFB and at the Range. Those items at the [illegible] Camp Cooke are WS 107 facilities used as is, except the launcher. Design criteria required to make a launcher capable of handling WS 117L can be included during construction.

** Miscellaneous support requirements at the Hawaii Station will not be required if the station is built on an existing Air Force Base and those facilities are available. The AFMTC and Cooke support facilities are assumed to be furnished by the AFB on which located.

In view of the estimated lead time from start of construction to completion, the time required for the installation and check-out of the complex gear to be contained in the facilities at Hawaii, the AIS Intelligence Center, and at Camp Cooke, together with the negotiation period for a contract for construction, these facilities must be approved and funded for in the FY 58 MCP Program.

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[illegible] SCHEDULE – [illegible]

117L [illegible] FLIGHT SCHEDULE

[redacted] CONFIDENTIAL 313

FY 58 FY 59 FY 60

CY 57 CY 58 CY 59 CY 60

[illegible]

NO.	CONFIGURATION	OBJECTIVES
1	Propulsion, autopilot, Geophysical instruments	Test structural integrity of booster, adequacy of booster and orbital vehicle autopilots, separation process engine operation, gather environmental data; test telemetry, ground equipment, train personnel.
2	Same as 1	Repeat of 1
3	Same as 1 plus beacon/transponder, AS platform, computer	Repeat of 1 plus inertial platform functional test. Test of orbital tracking equipment, ground and airborne.
4	Same as 3 plus orbital stabilization components, isotope power supply	First orbital try. Exercise of Camp Cooke ground installation. Repeat test of still-doubtful items. Test isotope power supply. Exercise of Hawaiian, New Boston and ARS Intelligence Center tracking station and/or minitrack net.
5	Same as 3 plus complete orbital stabilization programmer, visual system components	Second orbital try. Test camera and readout component equipment. Both satellite and ground station equipment.
6	Same as 5	Repeat of 5
7	Same as 5	Repeat of 6
8	Same as 5 plus data link	Test of data transmitter, receiver and antennas.
9	Same as 6 but with complete visual sub-system	First test of visual system. Command post exercise test of the ARS Intelligence Center operation.
10	Same as 9 plus isotope power supply	Contingent on success of 9, first high latitude shot obtaining useful reconnaissance data. Check-out of ground data handling system and Intelligence Center operation for complete visual system.

Flight test operations can be moved from AFMTC to Camp Cooke [illegible] Flight No 5 or before Flight No 10.

WDTR 57-13

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SUMMARY OF THE (SECRET) WDER 7-3-S-E, 19 Jul 56

WS 117L FY 58	Fund Requirements
P-500	$26.0 Million
P-100	35.6 Million
P-200	25.5 Million
P-300	23.0 Million

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1. ☐ ACTION REQUIRED ☐ CHANGE ☐ SIGNIFICANT EVENT ☐ RESULTS

MANAGEMENT REPORT

☒ SYSTEM ☐ PROJECT ☐ TASK ☐ ENGINEERING SERVICE

2. REPORTS CONTROL SYMBOL

PAGE 1 OF 2 PAGES

3. DATE: 31 January 1957

4. TITLE: (U) Advanced Reconnaissance System

5. NUMBER: WS 117L - MR #3

6. PREPARING AGENCY: HQ ARDC - WDD

7. RESP ORGN: WDD-WDTR

8. PARTICIPATING CENTERS: AFCRC, WADC, RADC, AFPTRC

9. PROGRAM STRUCTURE: 100

10. PARTICIPATION/COORDINATION/INTEREST:
USAF/AMC-P, APGC-P, ATC-P, SAC-C, ADC-C
USN/CND-I, USA/G/S-I, Other / CIA-I

11. TECHNICAL GROUP: 02

12. APPLICABLE AREAS

A. ☐ TECHNICAL B. ☐ TEST C. ☐ FUNDS D. ☐ MATERIEL E. ☐ FACILITIES
F. ☐ MANPOWER G. ☐ PERSONNEL H. ☐ TRAINING I. ☒ CONTRACTS J. ☐ AIRCRAFT

13. NARRATIVE

a. Authorization to obligate an additional $2,000,000 beyond the $3,000,000 previously authorized for System 117L was received 7 December 1956, in TWX, HQ USAF, AFDDP-B 33590. ✓

b. Letter Contract AF 04(647)-103 was let with the Massachusetts Institute of Technology on 25 Jan 1957. Work to be performed is in the Guidance and Control problem area. Funds allocated against this contract total $500,000.

c. Authority to obligate up to a total of $10,000,000 for FY 57 on the WS 117L program in TWX, HQ ARDC RDSCBC-1-16-E, dated 15 Jan 1957, was received.

d. Subsystem Project Plans are in the process of being written and Project number and task number assignments have been established. Upon completion of the writing of the Project Plans, a revision will be made to the System Development Plan. Target date for completion of these actions is the anniversary date of the WS 117L Development Plan, 2 April 1957.

e. Inclosed is a list of project number and task number assignments made during the process of writing Project Development Plans.

f. (1) PR #57-WDD-196-I dated 22 Jan 1957 was initiated to add $5,563,000 to the Lockheed Aircraft Corporation Contract AF 04(647)-97.

(2) OA #57-17 dated 25 Jan 1957 was initiated to transfer $320,000 to RADC for continued effort in the Data Processing and Dissemination area for WS 117L.

(3) OA #57-15 dated 25 Jan 1957 was initiated to transfer $195,000 to WADC for continued effort in research on conversion equipment for nuclear auxiliary power units and for continued research on solar auxiliary power units for WS 117L.

(4) OA #57-16 dated 25 Jan 57 was initiated for transfer of $422,000 to AFCRC for continued research in the Geophysical Environment Area for WS 117L.

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WD-57-00437

g. The summary of FY 57 funds initiated on WS 117L is:

Lockheed Aircraft Corporation	AF 04(647)-97	$8,563,000
Massachusetts Institute of Technology	AF 04(647)-103	500,000
WADC	OA #57-15	195,000
RADC	OA #57-~~15~~17	320,000
AFCRC	OA #57-16	422,000
TOTAL		$10,000,000

h. Reproduction and distribution of this report is forbidden except on express approval of the WS 117L Project Office.

1 Incl
Project Number Assignment
1 page (SECRET)

Charles H Terhune
CHARLES H. TERHUNE, Jr., Colonel, USAF
Deputy Commander, Technical Operations

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PROJECT NUMBER ASSIGNMENT

Project #	Project	Task #'s
P 1755	Airframe	39750 - 39767
P 1756	Propulsion	39768 - 39782
P 1757	Auxiliary Power Unit	39783 - 39790
P 1758	Guidance and Control	39800 - 39811
P 1759	Visual Reconnaissance	39812 - 39821
P 1760	Ferret Reconnaissance	39822 - 39831
P 1761	Infra-Red Reconnaissance	39832 - 39839
P 1762	Ground Space Communication	39840 - 39854
P 1763	Data Processing	39855 - 39862
P 1764	Geophysics	39791 - 39799
P 1765	Unassigned	
P 1766	Unassigned	
P 1767	Unassigned	
P 1768	Unassigned	
P 1769	Unassigned	
P 8728	QPRI	39863 - 39864

SECRET

WD-57-00437

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4. The most interesting part of the program came up during the discussion period after the special topics outlined above were completed. During this period Colonel Gibbs raised the question of what contributions the Vanguard program would provide for a follow-on satellite program - particularly, contributions to the Department of Defense. Colonel Gibbs (NRL) had prepared a draft letter to the Department of Defense outlining these contributions in the areas of :

a. Upper atmosphere, geophysical environmental and design data.

b. Techniques for astronautical vehicles.

c. Hardware (off the shelf items), developed for the Vanguard program.

d. Political aspects, primarily in establishing the concept of freedom of space.

5. No real objections could be expressed to any of the claims made in the draft letter, except references to the "Advanced Reconnaissance Satellite" which were removed. However, many of the items listed as contributions in the areas of environmental data, techniques and hardware were of questionable validity in-so-far as WS-117L was concerned. A copy of the letter finally forwarded to DOD will be sent to WDD for information.

6. Personnel of the NRL are not at all hesitant to indicate that they fully intend to continue a follow-on program to the IGY, but are very careful to steer clear of any inference of a military application of their efforts.

7. Colonel Gibbs pointed out in a private conversation that the National Academy of Science, U. S. Committee for the IGY ,Technical Panel for the Satellite Program, has already made inquiries as to the best program for an IGY follow-on program. He also pointed out that the information submitted in the WDTR TWX on the IGY "back-up" program was not intended to be a back-up program for the IGY, but a "follow-on" program to the IGY, and that the data submitted by the Air Force in the form of the TWX was not what the committee for Satellite programs wanted. Colonel Gibbs gave Colonel Oder a copy of a letter from Mr. R. W. Porter, Chairman of the technical panel on the Earth Satellite program which outlined the follow-on program objectives. A copy of this letter and the agenda for the NRL meeting is attached.

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8. The Air Force by its own inactivity and lack of support of WS 117L is swiftly loosing the initiative in an area that is its basic heritage. Not only from the stand point of roles and missions, but from the stand point of leadership in the development and utilization of new advancements in the field of aeronautics, astronautics, propulsion, guidance and control, electronics and the other fields of science involved in the satellite program.

9. This lack of support and loss of initiative was further borne out in discussion with Lt. Colonel Ahola and Lt. Colonel Jim Finton of General Putt's office. Colonel Gibbs and Colonel Finton have both recommended to General Putt that immediate and positive action is necessary to counteract this impending loss of initiative. The action recommended is the establishment of a new R&D Staff section with the sole responsibility of promoting Air Force development in the field of astronautics. However, this must be preceded by a "solid-front" campaign by General Schriever, General Ritland, General Power, and others to "convince" the airplane minded Air Staff of the future importance of present Air Force leadership in this area. The word present is emphasized. The Army and Navy are both dilligently working - brain washing - the IGY people, and the DOD R&D staff of their superior competence in the satellite field. The Air Force on the other hand has no staff agency assigned to even monitor the progress of the activities of the DOD in these areas. Colonel Finton cited a case where he had difficulty in getting someone to attend the meetings of the DOD Stewart Committee Meetings.

10. FY 57 and 58 funding status of WS 117L was discussed with Major Dillon and Colonel Finton. The results of the 29 November and 30 June funding letters to DCS/D are being forwarded to WDD in a 6 March letter from General Putt.

2 Incl:
copy of ltr and
agenda for NRL
meeting (UNCL)

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L
Technical Operations

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WDT

27 March 1957

MEMORANDUM TO GENERAL SCHRIEVER

SUBJECT: Letter on WS117-L

1. There is attached a letter on the 117L, for your signature, in answer to a letter signed by Gen Putt dated 6 March.

2. This letter strikes me as being a rebuttal to Gen Putt's letter, of the type that accomplishes nothing. In other words it is a 2,000-mile duel between staff agencies that do not agree upon the rate of progress to be assigned to a project.

3. My principle worry, however, concerns the effect of this type of exchange upon your long-range plans for the 117L, the Satellite business, and/or the role of the Air Force in space technology. I am not forwarding this for signature for the reason I believe it is time that we sit down with Gen Putt and talk over the Air Force position in this field on a high level before we "lap"ourselves on this project. I am hoping this meeting can be arranged for 29 March, during our visit, but if you happen to find this subsequent to my being in Washington, I hope you will give this consideration and meet with Gen Putt at your earliest opportunity.

1 Incl
Ltr thru Comdr, ARDC
to DCS/D - S - WDTR57-70.

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

WHEN INCLOSURES ARE WITHDRAWN THE CLASSIFICATION OF THIS CORRESPONDENCE MAY BE DOWNGRADED TO CONFIDENTIAL IN ACCORDANCE WITH AFR 205.1.

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WDTO
2 April 1957 Change

System Officers

WS 117L

	NAME	EXT		BLDG	ROOM	CONTRACT NO.	COMPANY
Director for WS 117L	L/Col F. C. E. Oder	(1343-1344)		5	512		
Assistant Director	Comdr R. C. Truax	(1319-1326)		5	518		
Plans & Programming	Lt Col Q. A. Riepe	"	"	5	516		
Program Management	"	"	"				
Resources Management	Maj R. E. Zelenka	"	"	5	516		
System Engineering	Comdr R. C. Truax	"	"	5	518		
A.	Lt J. C. Herther	"	"	5	519		
B.	"	"	"	5	519		
C	Maj G. Austin	"	"	5	518		
D	Lt J. C. Herther	"	"	5	519		
E	Maj E. J. Conway	"	"	5	521		
F	Capt W.O. Troetschel	"	"	5	519		
G	Maj G. Austin	"	"	5	518		
H	Capt W.O. Troetschel	"	"	5	519		
I	Maj H. F. Wienberg	"	"	5	521		
Facilities and Test	Lt Col Q. A. Riepe	"	"	5	516		

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Office of WDD Liaison Officer
ABMA
Huntsville, Ala.

MEMORANDUM FOR GENERAL SCHRIEVER

19 April 1957

SUBJECT: Satellite Study

1. During the month of January preliminary design studies of a modified Jupiter capable of launching a 36" sphere into a satellite orbit were completed. The design studies contemplated the use of four stages. A Jupiter booster stage, a cluster of 10 ASP rockets for the second stage and two stages with one solid propellant rocket each would comprise the third and fourth stages. Stages 2, 3, and 4 would begin rotation approximately 20 seconds prior to separation of the Jupiter booster stage. The 36" sphere satellite would be equipped with a separation rocket and an anti-spin mechanism.

2. The investigation included a study of the lifetime of a circumterrestial four stage unit, both with and without a final "kick" at apogee. A special case for an azimuth launching 187° North through East for reconnaissance applications was investigated.

3. In addition to the consideration of a Jupiter boosted satellite, a study of a Jupiter C (Redstone boosted) version was made, both with and without "kick" at apogee.

cc: WDTI
[redacted]

EMMETT J. KELLY
Lt Col USAF
WDD Liaison Officer

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JOINT MESSAGEFORM

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ROUTING

MUNICATIONS CENTER NO.

SPACE ABOVE FOR COMMUNICATIONS CENTER ONLY

FROM: (Originator)
COMDR WDD ARDC INGLEWOOD CALIF

DATE-TIME GROUP 232400Z APR 57	SECURITY CLASSIFICATION UNCLASSIFIED
PRECEDENCE FOR: ACTION PRIORITY	INFORMATION
☐ BOOK MESSAGE	☒ ORIGINAL MESSAGE
☐ MULTIPLE ADDRESS	CRYPTOPRECAUTION ☒ YES ☐ NO

REFERS TO MESSAGE:

IDENTIFICATION	CLASSIFICATION

TO:
DIRECTOR OF MILITARY PERSONNEL, DCS/P
HQ USAF
WASHINGTON, D. C.

INFO:

UNCLASSIFIED FROM WDSP-4-11-E

FOR AFPMP-1-C-3 ATTN LT COL LEMES. COMMANDER ROBERT C. TRUAX, 82506, USN, IS PRESENTLY ASSIGNED TO THE WESTERN DEVELOPMENT DIVISION AS DEPUTY ASSISTANT FOR WEAPON SYSTEM 117L, A HIGH PRIORITY PROJECT. COMMANDER TRUAX HAS BEEN ASSIGNED TO THIS ORGANIZATION LESS THAN TWO YEARS. HE HAS BEEN OF GREAT VALUE TO THE WDD AND HIS TRANSFER FROM HIS PRESENT DUTY AT THIS TIME IS NOT DESIRABLE. THIS OFFICER HAS THE BACKGROUND AND EXPERIENCE NECESSARY TO THIS WEAPON SYSTEM DEVELOPMENT PROGRAM. IT IS REQUESTED THAT THE DEPARTMENT OF NAVY BE CONTACTED WITH A REQUEST THAT COMMANDER TRUAX BE EXTENDED IN HIS PRESENT ASSIGNMENT FOR ONE YEAR. IN THE EVENT THAT THE ASSIGNMENT CANNOT BE EXTENDED, A CRITICAL NEED WILL EXIST TO REPLACE HIM WITH AN AIR FORCE OFFICER OF SIMILAR QUALIFICATIONS.

WDG Reading File

DRAFTER'S NAME (and signature, when required) Paul L. Maret, Major, USAF	SECURITY CLASSIFICATION UNCLASSIFIED	PAGE 1 OF 1 PAGES
SYMBOL WDSP	TELEPHONE 624	RELEASING OFFICER'S SIGNATURE SIGNED
		OFFICIAL TITLE O. J. RITLAND Brig. Gen., USAF Vice Commander

DD FORM 1 OCT 49 173 REPLACES NME FORM 173, 1 MAY 49, WHICH MAY BE USED.

c9—16—58923-4 U. S. GOVERNMENT PRINTING OFFICE

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WDTL

MAY 8, 1957

MEMORANDUM FOR COLONEL CHARLES H. TERHUNE, JR.

SUBJECT: Follow-on Work for WDD

1. It is obvious from numerous technical feasibility studies that have been made, that with a relatively small additional effort (funds and facilities) beyond the ballistic missile program it is now possible to achieve the capability to place a payload of reasonable weight on the moon or to circumnavigate the moon without landing and return to the vicinity of the earth. And, if such a program were phased in at the proper time it could be achieved at no over-all increase in manpower on the part of either WDD/R-W or industrial contractors, except for a few people in the preliminary planning area. These few would have to be authorized and preliminary plans started now.

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2. Rand, Convair, Aeroneutronics, Systems Laboratories, and many other competent organizations have made feasibility studies of lunar vehicles. HADC and OSR have active projects underway for ultimately accomplishing this objective in phased programs. The feasibility of placing reasonable sized payloads on the moon depends first upon the availability of large thrust boosters. Various studies have proposed the use of the SM-65, AM-68 or SM-75 propulsion systems as boosters on lunar vehicles. Rand's study proposed the use of the SM-65 to put a 300# space vehicle on course and to land 50# of instrumentation. A study by Systems Laboratories, Inc. proposes a 4-stage lunar vehicle with the SM-75 as the first stage. This could put a 12.4# payload on the trajectory around the moon and return to within 1,000 miles of the earth with instrumentation such that technical information could be transmitted. HADC has also made preliminary studies for research vehicles including a lunar vehicle. This system has been designated 454L by Hq ARDC and a Development Plan has been prepared covering development of some phases and study of others. OSR has an additional program underway, first study, later development, for a research vehicle to explore the regime 4,000 N.M. out from the surface of the earth and later for a vehicle to land on or circumnavigate the moon. The feasibility of doing this also depends upon the availability of an adequate guidance system which will also have to come from current ballistic missile systems development.

3. WDD already is involved in the satellite program which utilizes some of the hardware from the ICBM program, and I believe will become more and more involved in future programs of the type mentioned above. First, there will have to be research vehicles

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and exploratory flights to gather data, then as design information is accumulated, the proper direction to take for a new Weapon System will become apparent. This may be a lunar vehicle, a communications satellite system or some other type of satellite or space vehicle. I do not feel that we should wait for a military requirement to be extablished. Much, of a preliminary investigative nature has to be undertaken first. I believe that the WDD/R-W complex is the best qualified to do this, particularly when components that have been developed here are often the ones that establish the feasibility. I feel that we have adequate justification in the following:

a. The ARDC mission is to maintain qualitative superiority. Within ARDC, WDD is uniquely qualified to judge the timeliness of initiating the technical developments necessary to achieve future goals. Our organization is already developing the basic hardware which will provide the first step towards a military satellite or the first flights to outer space. Moreover, WDD is the only organization which, by virtue of its experience, can most accurately assess the feasibility of taking the next step forward. I believe that these factors are recognized within ARDC and that WDD must assume a position of leadership in this area.

b. Our present organization and programs will provide the most efficient means of taking the next step. In this way the Air Force will get many of the necessary factors to pursue the necessary development at exzentially no cost. A highly competent military-civilian team is already assembled which possesses the necessary knowledge and ability. The impetus to extend our endeavor exists now. As mentioned previously, the basic hardware is already under development. In addition, our program for supporting research is already established and requires only modest extension to directly support the type of programs I have mentioned.

c. Specific military requirements must be based on technology. Technology in the field of ballistic missiles, satellites and space vehicles is advancing rapidly now and is capable of greater advances in the near future. The advanced knowledge to be attained through such a program must be attained before military requirements can be intelligently stated.

(SIGNED)
LAWRENCE D. ELY, COLONEL, USAF
Director, Technical Divisions
Weapons Systems

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Maj Dillon

(9 May 57)

([redacted]) Air Force Satellite Program

1. The Director of the Bureau of the Budget in his memorandum to the President dated 30 April 1957, subject: "Project Vanguard", referred to the Air Force Reconnaissance Satellite Vehicle. The attached proposed memorandum for the Deputy Secretary of Defense comments on the Air Force Advanced Reconnaissance System and the Air Force Proposal for a Scientific Satellite.

2. A chronological listing of actions or decisions to date on the Advanced Reconnaissance System and a summary of the National Security Council Paper 5520 and subsequent comments to that paper are attached as inclosures.

3. It is understood that the next meeting of the National Security Council will review the Satellite Program and that the Air Force summary of the Advanced Reconnaissance System is desired by Secretary Quarles prior to that meeting.

RECOMMENDATION

4. That the proposed memorandum for the Deputy Secretary of Defense be signed.

3 Incls
1. Memo for Deputy Secy of Defense
2. Summary of The Advanced Reconnaissance System Development
3. Summary of the Natl Security Council Papers on Satellites

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5 May 57

MEMORANDUM FOR DEPUTY SECRETARY OF DEFENSE

SUBJECT: Air Force Satellite Program ~~(S)~~

1. Reference is made to the Memorandum for the President from the Director of the Bureau of the Budget dated 30 April 1957.

2. Since 1945 the Air Force has been studying the feasibility and various uses of satellites. In February 1954 the final RAND report recommended that the Air Force initiate development of a reconnaissance satellite. Development was immediately started under Project 1115 and became Weapon System 117L in August 1956.

3. The National Security Council Paper NSC 5520 of May 1955 directed the Department of Defense to initiate the development of a small scientific satellite (Vanguard). It is also observed in that same paper that larger satellites, capable of carrying more scientific instrumentation, would be required for future research.

4. In his memorandum for the National Security Council on 8 May 1956, Mr. James S. Lay Jr., Executive Secretary, requested further studies on the need and feasibility of constructing and launching up to six additional satellites as recommended by the U.S. National Committee for the IGY, and the Director, National Science Foundation, and of utilizing alternative missiles to those contemplated in Project Vanguard.

5. The Air Force, recognizing that the political acceptability of the intelligence surveillance satellite is greatly enhanced by the prelude of a scientific program, has made two proposals to the Department of Defense recommending the use of the Advanced Reconnaissance System modified to a scientific satellite and equipped with appropriate geophysical instrumentation. The gross weight of such a system on orbit would be approximately 4,500 pounds with a payload of 1,500 pounds. This Atlas boosted satellite could be available in approximately 18 months from go ahead and would utilize a considerable amount of development effort already applied to the Advanced Reconnaissance System. Cost estimates submitted to the Department of Defense in February 1957 totaled $91,130,000 for development and launching of six satellites.

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6. Any future satellite program must incorporate major improvements over the present 20 pound Vanguard. The Air Force can produce such a system within a relatively short time. A scientific satellite of similar external design to the Advanced Reconnaissance System will provide very valuable information for future weapon system development and operation of all space vehicles. The planned Advanced Reconnaissance System test program includes the firing of test nosecones to obtain environmental data. These will be essentially scientific satellites which must necessarily precede the full-scale operational program.

7. Satellites are a new form of Air Power. As the Air Force has pioneered this program and has the equipment, background and experience in missile development, it is strongly recommended that the Air Force be assigned exclusive development and operation of all future satellite systems.

8. A summary of the actions and decisions to date on the Advanced Reconnaissance System is attached as Inclosure No. 1. A summary of the National Security Council Paper NSC 5520 is attached as Inclosure No. 2.

2 Incls
1. ARS Summary
2. NSC 5520 Summary

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9 May 57

SUMMARY OF THE ADVANCED RECONNAISSANCE SYSTEM DEVELOPMENT

1. The concept of using a satellite as a platform for reconnaissance equipment can be considered as the natural outgrowth of the requirement for obtaining intelligence information of a potential enemy whose area and security preclude its effective collection by ordinary aerial reconnaissance or other means. The need for timely and continuous intelligence information to assess a potential enemy's capabilities and probable intent has become more critical as the advancement of technology has given them offensive weapons with intercontinental range and greater destructive powers. The impetus which motivated the military establishment to foster work on new methods for collection of intelligence information came from the realization that current, reliable, prehostilities intelligence information is required to insure proper direction of National Planning in development of effective counterforce weapons and counterforce strategy.

2. The results of the numerous studies conducted since 1946 concluded that a Satellite Intelligence System was feasible and would ~~satisfy, to a great extent, the requirements for intelligence information~~ to aid the national planners in making decisions.

3. The concept of the Advanced Reconnaissance System is a result of studies conducted at the Rand Corporation. A study completed in 1947, together with similar investigations by other contractors, concluded that a satellite vehicle was feasible as a reconnaissance vehicle but not as a weapon carrier. In 1950, the Research and Development Board vested satellite custody in the Air Force, and Rand was directed to explore its possible military utility.

4. The following is a chronology of the events in the satellite program to date:

a. 1946-47 - Rand Study developed the concept of the satellite as a reconnaissance vehicle but not as a weapon carrier.

b. 1947-1953 - Further studies by Rand.

c. 1948 January 16 - General Vandenberg issued a Statement of Policy for a Satellite Vehicle stating that Research and Development will be pursued as rapidly as progress in the Guided Missile art justified and requirements dictate.

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d. 1950 - Research and Development Board vested satellite custody in the Air Force.

e. 1951 - Rand made further recommendations for reconnaissance applications in their report (RAND - 217, April 1951).

f. 1951 - Feasibility studies for critical subsystems initiated for Television (RCA), altitude control (North American Aviation), and Nuclear Auxiliary Power Units (Bendix Aviation, Frederick Flader, Allis Chalmers, and Vitro Corporation).

g. February 1954 - Final Report by Rand (Rand 262) recommending the development of the Advanced Reconnaissance System.

h. 27 November 1954 - The ARDC published System Requirement No. 5.

i. 16 March 1955 - General Operational Requirement Number 80 was published.

j. March 1955 - Design study proposals were solicited ~~from selected contractors. Those solicited were the Lockheed Aircraft~~ Corporation, the Radio Corporation of America, Glenn L. Martin Company, and Bell Telephone Laboratories. Bell Telephone Laboratories declined to submit a proposal.

k. 20 May 1955 - National Security Council paper (NSC 5520) on U. S. Scientific Satellite Program.

l. 21 May 1955 - Joint Chiefs of Staff Comments on NSC 5520 (JCS 1899/208).

m. 17 October 1955 - ARDC revised System Requirement No. 5.

n. 14 January 1956 - The Western Development Division of the Air Research and Development Command completed a proposed Development Plan for a Scientific Satellite System capable of being launched during the International Geophysical Year. Cost of launching six satellites was estimated to be $95,500,000. Plan was submitted to DOD.

o. March 1956 - Design studies culminated in three separate and distinct development plans. The Lockheed proposal was considered to meet the requirements most satisfactorily.

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p. 3 April 1956 - The Western Development Division of the Air Research and Development Command completed a Development Plan for Weapon System 117L, the Advanced Reconnaissance System.

q. 8 May 1956 - Memorandum for the National Security Council, subject: "NSC 5520" by James S. Lay Jr., Executive Secretary.

r. 24 July 1956 - The Development Plan for WS 117L was approved by Headquarters USAF.

s. 3 August 1956 - Development Directive 85 was issued on WS 117L. $3,000,000 of FY-57 P-600 Funds made available to ARDC to initiate development.

t. 17 August 1956 - ARDC System Development Directive was issued.

u. October 1956 - Lockheed Aircraft Corporation was awarded a development and test contract (AF 04(647)-97). Massachusetts Institute of Technology was awarded the contract for Research and Development of the WS 117L Guidance and Orbital Altitude Control ~~Equipment in Contract AF 04(647)-103.~~

v. 10 December 1956 - Guidance letter was sent to ARDC following a briefing presented to Mr. Quarles on 29 November 1956. An additional $2,000,000 was programmed to raise the total to $5,000,000 of P-600 funds for FY 1957. ARDC was told to continue development and testing of all component items and not to plan to launch this system prior to FY 1961.

w. 21 December 1956 - The Assistant Secretary of Defense (R&D) stated the Air Force requirement for a nuclear auxiliary power source for WS 117L.

x. 8 January 1957 - Release of an additional $5,000,000 FY 57 P-600 was made to raise the total to $10,000,000.

y. 11 February 1957 - At the request of the Assistant Secretary of Defense (R&D) the Air Force submitted new cost estimates and time schedules for the development and launching of a Scientific Satellite modified from the WS 117L Advanced Reconnaissance System. The plan included estimated costs of $91,130,000 for development and launching of six scientific satellites. The proposal, based on the removal of reconnaissance equipment and the installation of geophysical instrumentation, stated that it would be possible to make at least two test launchings during the International Geophysical Year.

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z. 4 April 1957 - Memorandum for DCS/M from Mr. Horner stating that the Secretary of the Air Force has approved placing P-100 funds on the ARS.

a.a. 15 April 1957 - $3,900,000 of FY 57 P-100 funds released to WS 117L.

b.b. 15 April 1957 - The ARDC and WDD submitted the funding estimates for WS 117L for the next three years in millions of dollars as follows:

	FY-58	FY-59	FY-60
P-100	$19.87	$44.0	$44.0
P-200	12.49	26.0	26.0
P-300	4.53	24.0	--
P-600	10.00	25.0	25.0
TOTAL	~~$46.89~~	~~119.0~~	95.0

c.c. 29 April 1957 - Discussion with Mr. Holaday, Deputy Assistant Secretary of Defense (R&D) on Air Force Satellite Program. Mr. Holaday was briefed on the Air Force spending for FY-57 and the proposed program costs for FY-58, FY-59, and FY-60. Discussion also included some remarks on the Scientists request for an improved Vanguard satellite program for 30 vehicles to be launched from Point Mugu, California, as a follow-on program to the present International Geophysical Year satellite program.

d.d. 1 May 1957 - A revised ARDC-WDD Development Plan for WS 117L dated 2 April 1957 was received in this Headquarters.

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SUMMARY OF THE NATIONAL SECURITY COUNCIL PAPERS ON SATELLITES

1. NSC 5520, May 1955.

a. The NSC 5520 directs the Department of Defense to develop the capability of launching a small scientific satellite by 1958, with the understanding that this program will not prejudice continued research directed toward large instrumented satellites for additional research and intelligence purposes, or materially delay other major Defense programs.

b. The paper points out the technical, prestige and psychological benefits that may be derived from establishing small scientific satellites and the activities of the USSR in this area. It goes on to state that the U. S. should emphasize the peaceful purposes of the launching of such a satellite, although care must be taken as the project advances not to prejudice U.S. freedom of action (1) to proceed outside the IGY should difficulties arise in the IGY procedure, or (2) to continue with its military satellite programs directed toward the launching of a large surveillance type satellite when feasible and desirable.

c. This paper further points out that from a military standpoint, the Joint Chiefs of Staff have stated their belief that Intelligence applications strongly warrant the construction of a large surveillance satellite. While a small scientific satellite cannot carry surveillance equipment and therefore will have no direct intelligence potential, it does represent a technological step toward the achievement of the large surveillance satellite, and will be helpful to this end so long as the small scientific satellite program does not impede development of the large surveillance satellite.

d. The Financial Appendix outlined the estimate of costs of the scientific satellite as:

Satellite Vehicle	$10 - 15 million
Instrumentation for Tracking	$ 2.5 million
Logistics for Launching and Tracking	$ 2.5 million
TOTAL	$15 - 20 million

It also stated that these estimates include exploratory studies for a back-up program based upon the "Atlas" Missile and "Aerobee" research rocket development.

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e. A technical annex and views of Mr. Nelson A. Rockefeller, Special Assistant to the President, were attached.

2. In follow-on correspondence on this subject in a memorandum for the National Security Council by James S. Lay Jr., Executive Secretary, dated 8 May 1936, he stated that at the NSC meeting of 3 May 1956 the NSC 5520 policy was reviewed and that it is not in the national security interest (1) to cancel the program, or (2) to slow down the program, missing the IGY. Also, that the policy in NSC 5520 would be continued with the understanding that the program would not interfere with the ICBM and IRBM. This paper also requested the Department of Defense to submit a report on NSC 5520 not later than 1 October 1956; including a report on further studies of the need and feasibility of constructing and launching up to six (6) additional satellites as recommended by the U.S. National Committee for the IGY and the Director, National Science Foundation, beyond the six (6) currently programmed by the Department of Defense, and of utilizing alternative missiles to those contemplated in Project Vanguard.

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MEMORANDUM FOR: Col. C. H. Terhune MAY 9 1957

SUBJECT: Ability of Aircraft Laboratory of WADC to fulfill WDTR requirements.

1. On 2 May, WDTR was visited by Mr. Carl Reichert of the Aircraft Laboratory, Wright Air Development Center, and Col. L. D. Ely, WDTL. Mr. Reichert was quite concerned about the ability of the Aircraft Laboratory of WADC to fulfill the requirements placed against them by WDTR.

2. In a letter to WADC, 28 February 1957, WDTR requested WADC to provide qualified technical personnel to;

a. Serve as advisory technical monitor, through the WS 117L project office, of the system prime contractor, his subcontractors and associate contractors.

b. Provide technical consultants to the WS 117L project office as required.

c. Maintain timely and complete knowledge of the direction of effort, the planned technical program and the progress in the WS 117L subsystem areas.

These services were requested in the Vehicle, Propulsion, Auxiliary Power Unit, Visual Reconnaissance, Infrared Reconnaissance, and Ferret Subsystems. WADC Laboratory Personnel were named in the subsystem project documents as technical advisors in these areas. Mr. S. W. Dunham was specifically named from the Aircraft Laboratory.

3. During his visit, Mr. Reichert stated that he was concerned about the Aircraft Laboratory competence to provide this service. His concern stemmed from the fact that WCLS has not been in on the WS-107 or WS-315 programs, and has not followed the development and analysis techniques in the ballistic missiles in general. In view of this (plus the fact that WADC has made no attempt to collect the data that is available on this from WDD, R-W, Convair, Martin and Douglas) Mr. Reichert doubted the competence of WADC Aircraft Laboratory to provide the technical assistance requested in the Airframe Subsystem.

4. There are several alternate sources for this assistance: i.e.,

(1) WDTR currently has a call contract with the University of Michigan which could be expanded to provide assistance in certain problem areas.

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(2) We could approach Holloman Air Development Center for the assistance required in this, the Airframe Area.

(3) We could, through negotiation obtain this assistance from the Aerodynamics and Structures people of R-W. These alternate sources are listed in what we believe is the order of preference.

5. This memo is not intended to request a decision but to inform you of a problem area which will, in the near future, require considerable watching.

FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

CONFIDENTIAL

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SECRET ~~CONFIDENTIAL~~ 151

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WDTI

14 May 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: VANGUARD

1. Informal information reaching WDTI has indicated that the Navy VANGUARD Program is in serious trouble, particularly with respect to availability of adequate power plants.

2. The inclosed Memorandum for General Schriever (Inclosure 1) dated 19 April 1957, transmitted by Lt. Col. Kelly from Huntsville, indicates that ABMA is probably planning to exploit this situation in a manner which would tend to lead to further unfortunate dissention between the Armed Services of the United States, and provide a means for dissemination of vast quantities of misleading propaganda which might ultimately adversely affect WDD.

3. In the interests of exploring potential means to aid the Navy in its apparent unfortunate dilemma, WDTI requested R-W to briefly study the possibility of substituting the THOR plus elements of the X-17 for the original configuration developed by the Navy program. The inclosed study (Inclosure 2) is the result of this request. In spite of its superficial nature, it tends to confirm the belief of WDTI that a successful orbiting satellite configuration could be made available in time to meet the commitments of the Navy project.

4. It is suggested that in order to avoid embarrassment to the United States with regard to its satellite commitments for the IGY, aid the Navy in a difficult predicament, and prevent placing ABMA in a position which would probably not be in the best interests of the United States, the following plan be considered:

a. This study (Inclosure 2) be released to the Navy and discussed with appropriate authorities to assure that its potentialities are understood,

b. If Navy desires to proceed further, that it be informed that arrangements can be made to release THORS, SERGEANTS and RECRUITS as specified for the Navy at times mutually agreed upon.

c. That the Navy VANGUARD Project should be responsible for the design of required connecting structures between these stages, staging gear, etc; for the assembly of the complete missiles; and for the conduct of the launching program.

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DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

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~~SECRET~~

(1)

X5-57

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1 Feb 57

JWPHP34
HPA205 TXA246 TDC203HQE172
PP RJEPYB RJWPHP
DE RJEPHQ 869
P 011712Z
FM HQ USAF WASHDC
TO RJWPHP/CMWDD INGLEWOOD CALIF
INFO RJEPYB/COMARDC BALTO MD
BT

UNCLASSIFIED FROM AFDRD-SS 47017 REFERENCE TELECON 31 JANUARY 1957 BETWEEN COLONEL ODER YOUR HEADQUARTERS MAJOR DILLON THIS HEADQUARTERS AND TO PRELIMINARY DEVELOPMENT FOR WS 117L DATED 14 JANUARY 1957.

INFORMATION REGARDING POSSIBLE USE OF WS 117L FOR INTERNATIONAL GEOPHYSICAL YEAR HAS BEEN REQUESTED BY DEPARTMENT OF DEFENSE. REQUEST FOLLOWING QUESTIONS BE ANSWERED

A. WHAT IS COST TO DEVELOP IGY SATELLITE NOSE CONE
B. WHAT IS ORBIT AND PAYLOAD
C. WHAT IS ESTIMATED TOTAL COST OF PROJECT FOR SIX LAUNCHING

TRIES

D. WHAT IS FUNDING BREAKDOWN FOR FOLLOWING
TEST VEHICLES PROGRAM
SIX LAUNCHING VEHICLES
SIX SATELLITES BASED ON PAYLOAD OF 1500 LBS
LAUNCH FACILITY. CAN ATLAS BE LAUNCHED FROM PRESENT VANGUARD PAD WITHOUT MODIFICATIONS WITH MODIFICATIONS IF NOT WOULD INTERFERENCE PREVENT USE OF PRESENT ATLAS PAD IF SO WHAT IS COST OF NEW PAD BLOCK HOUSE ETC
LAUNCH FACILITY OPERATING COST FOR 18 MONTHS
ESTABLISHMENT OF TRACKING STATIONS. WOULD ATLAS USE A TRACKING STATION OTHER THAN VANGUARD MINITRACK IF SO WHAT WOULD COST BE INCLUDING DEVELOPMENT PROCUREMENT TRACKING STATION ESTABLISHMENT AND OPERATING COST
OPERATING TRACKING STATIONS FOR 18 MONTHS
COST OF ORBIT COMPUTATION BY IBM OR OTHER METHODS TO INCLUDE DATA REDUCTION

REQUEST REPLY AS SOON AS POSSIBLE
BT
01/1721Z FEB RJEPHQ

[redacted]
CONFIDENTIAL

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FEB 4 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Visit to Missile Systems Division, Lockheed Aircraft Corporation, 30 January 1957

1. On 30 January 1957, the undersigned with Lt Colonel Q. A. Riepe visited MSD/LAC and discussed WS 117L management problems with Mr. J. H. Carter and Mr. R. M. Salter, Jr. of MSD.

2. We discussed the need for preparing new material for a planned series of high level briefings on the ARS. I emphasized that these briefings should show to those hearing it just what the ARS was going to do for them and give them confidence that it could and should be done that way. An initial outline was developed which would serve as basis for planning graphic material including possible animated film sequences. A course of action for Lockheed in support of this matter was agreed upon.

3. I advised Mr. Carter of the recent FY 58 fund request (hand-carried by General Schriever) and of the alternate course of action that had been considered. We told him where our request for FY 57 P-100 and P-200 funds stood. Mr. Carter asked for a basis on which LAC could plan their future effort on WS 117L and I advised him that as soon as we could we would send him a letter with as much information as we could provide. We discussed possible funding (in millions of dollars) as follows (Column "A" is Lockheed's view as set forth by Carter, "B" is our present WDD programming and planning figures):

FY	? A	B*
57	16.5	28
58	30	47
59	70	85

*Not all these funds go to LAC - some for GFE, some to Centers

4. We then discussed the present MSD organization for WS 117L. Inclosure 1 is the present organization as MSD (Carter) presented it. Inclosure 2 is, in my opinion, the actual present organization on a "working basis". Actually, this organization is poorer than that which existed before the "XA-Weapons System Manager" was established since it was then a homogeneous division of the MSD Research Branch with only the Vehicle Department on a "dashed line" from the Engineering Branch. The fundamental reason (as I told Carter) why the set-up stinks is that he has responsibility but insufficient authority. When he told me that these various departments from the "functional" branches of MSD (Research, Engineering, etc.) would have "permanently" assigned personnel and would be physically collocated with his people I told him that all this meant to me was that these people should be administratively part

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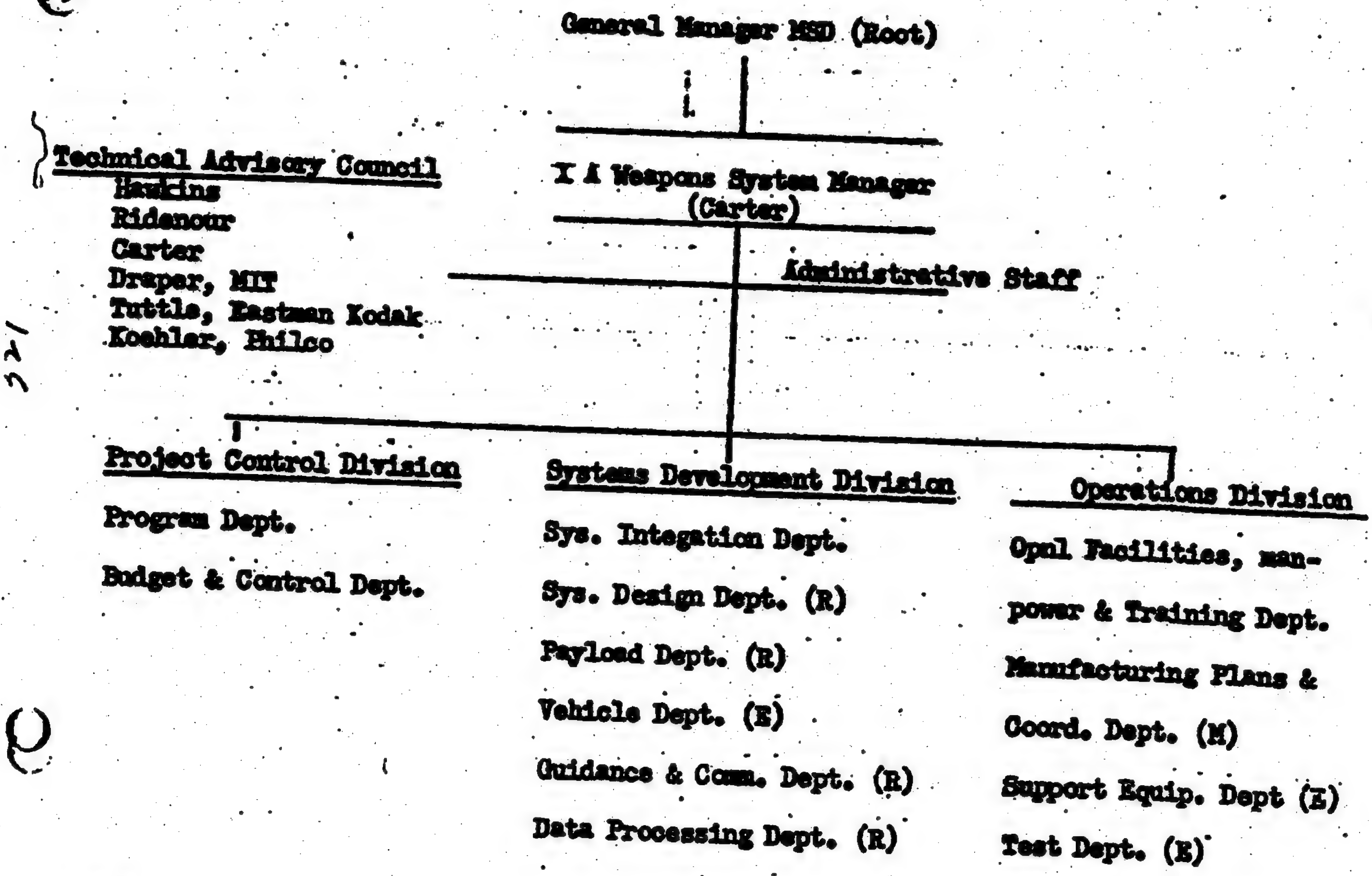
of his organization. Apparently this goofed-up arrangement which tries to straddle the fence between a functional and a project organization was directed by someone higher than Mr. Root, the General Manager of MSD and appears to be a device to protect the organizational and political positions of Ridenour and Hawkins. Carter told me he had an "agreement" with Ridenour to the effect that he, Carter, controlled the Research Branch people involved. I replied that this wasn't a very sound basis for an effective organization. Root has told Carter that the office of the XA-WS Manager could have between 10 and 50 people and at present Carter is negotiating for some 32 people. I surmise that Carter doesn't like the deal but was told to defend it. Stan Burriss is the Manager of XN Weapons System which is the POLARIS Project. I was told he didn't like his set-up. Carter asked that we give them a chance to make it work before taking this up at a higher level. I don't agree with him because I'm afraid that before we would be sure it was or wasn't working we could be in a very serious trouble. It was apparent to me (after a visit to the project shop at Sunnyvale) that the MSD WS 117L organization is confused and not getting much accomplished. No doubt some of this is due to our inability to give them a clear basis for planning (largely due to present unknowns in the non-P-600 area) but much more it is due (by their own admission) to uncertainties in their own organization and direction. I'm sure that Carter did all he could to set the thing up properly and I suspect that Root agreed with him but the present deal resulted from certain persons going over Root's head to the corporation.

5. Recommendation: In view of our past difficulties with MSD because of their "split" organization (which have been documented) and because of anticipated future difficulties, I recommend that this matter be brought to General Schriever's attention with the recommendation that this organizational problem be properly straightened out with the President of Lockheed. It should be noted that the present organization does not measure up to the Lockheed Management Proposal as quoted in Inclosure 3 which was strengthened verbally by Mr. Hibbard and Dr. Ridenour at the Contractor Evaluation Board hearings which resulted in recommending Lockheed over RCA and Martin.

3 Incls
1. LAC Organizational Chart
2. LAC Organizational Chart
3. Extract MSD 1593, LAC Summary Planning Data, 2 pp (SECRET) WDTR 57-28

FREDERIC C. E. ODER
Lt Colonel, USAF
Assistant for WS 117L
Technical Operations



General Manager MSD (Root)

X A Weapons System Manager (Carter)

Administrative Staff

Technical Advisory Council

Hawkins
Ridenour
Carter
Draper, MIT
Tuttle, Eastman Kodak
Koehler, Philco

Project Control Division

- Program Dept.
- Budget & Control Dept.

Systems Development Division

- Sys. Integration Dept.
- Sys. Design Dept. (R)
- Payload Dept. (R)
- Vehicle Dept. (E)
- Guidance & Comm. Dept. (R)
- Data Processing Dept. (R)

Operations Division

- Opnl Facilities, manpower & Training Dept.
- Manufacturing Plans & Coord. Dept. (M)
- Support Equip. Dept (E)
- Test Dept. (E)

N.B.

The departments with a parenthesis after them ((R), (E), (M)) denote departments which are assigned organizationally to the Research, Engineering and Manufacturing Branchs of MSD and which are under the "technical control" of XA WS Mgr.

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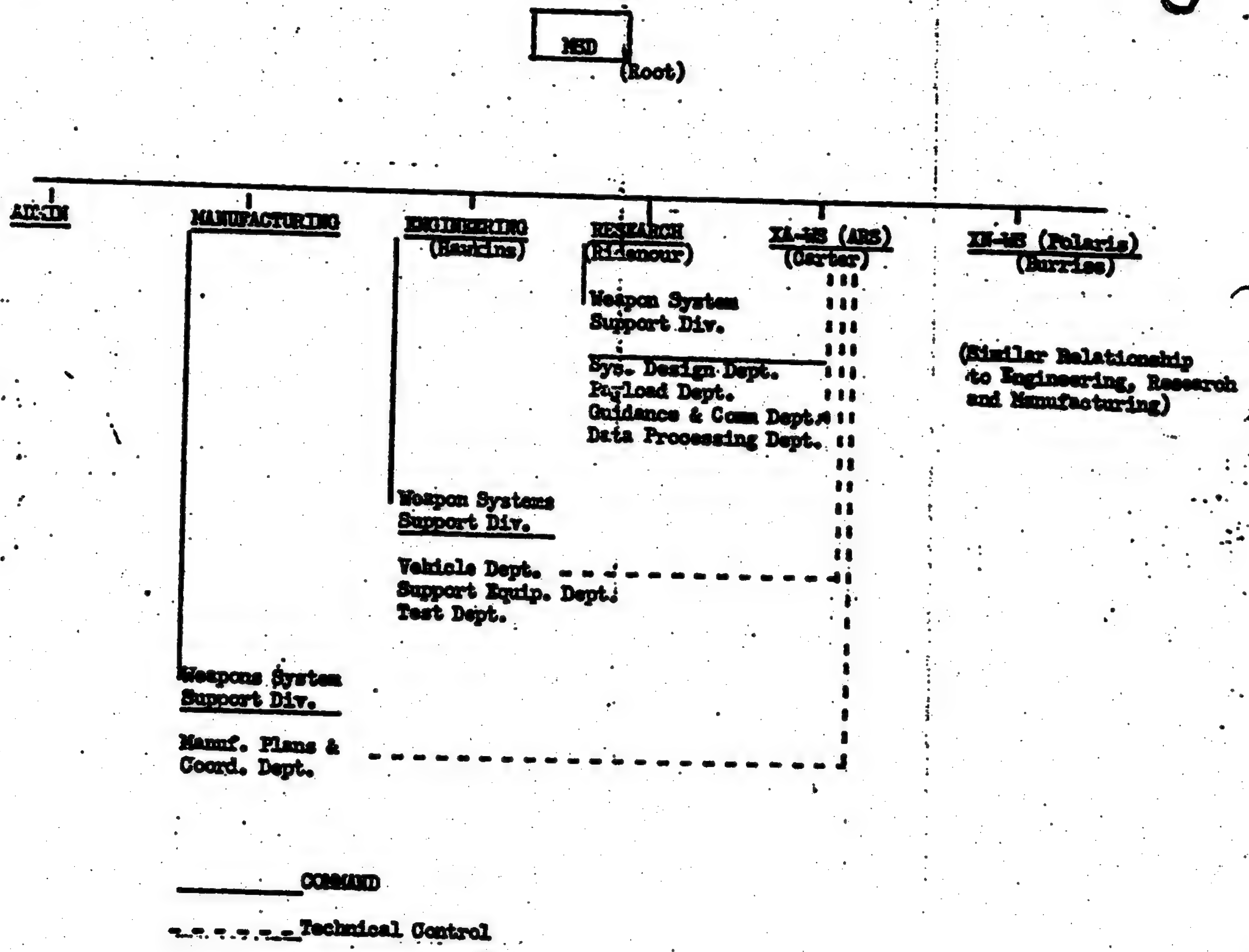
MSD
(Root)
ADMIN
MANUFACTURING
ENGINEERING
(Hawkins)
RESEARCH
(Ridenour)
XA-WS (ARS)
(Carter)
XN-WS (Polaris)
(Burriss)
Weapon System
Support Div.
Sys. Design Dept.
Payload Dept.
Guidance & Comm Dept.
Data Processing Dept.
(Similar Relationship
to Engineering, Research
and Manufacturing)
Weapon Systems
Support Div.
Vehicle Dept.
Support Equip. Dept.
Test Dept.
Weapons System
Support Div.
Manuf. Plans &
Coord. Dept.
COMMAND
Technical Control

Incl 2

SECRET CONFIDENTIAL

EXTRACT FROM MSD 1593, LAC SUMMARY PLANNING DATA (WD 56-02300)

Page 39

3. ORGANIZATION

A project organization will be established within the Research Branch of the Lockheed Missile Systems Division to handle the Pied Piper Project. Lockheed has achieved considerable success with this type of organization on previous occasions. The XP-80 and the XF-104 programs are examples. These programs were successful because:

1. The Project Manager was allowed to draw on the manpower and facility resources of the entire corporation.
2. The project organization was kept flexible and responsive directly to the needs of the project.
3. The Project Manager, and particularly the key people directly under him, were given the authority and responsibility and had the experience and judgment necessary to make sound decisions rapidly.
4. Customers' decisions were expedited usually through a single competent service project office which had full responsibility and authority to make them.
5. Administrative details, standardized procedures, etc., whether Lockheed-generated or customer-generated, were not allowed to delay the project.

The lessons learned from this experience will be applied directly to the organization of the Pied Piper project. Figure 3-1 compares the manpower build-up and the first flight dates for the XP-80 and the XF-104, with those for the proposed Pied Piper schedule. Manpower requirements are higher for the Pied Piper because of the major difference between flight-tests with

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missiles and those with aircraft. In the case of aircraft, the first flight-test article can be used for repeated development-test-flights; thus one or a very small number of such initial flight-test articles is required. For missiles, one test article is needed per test flight.

Because of the accelerated nature of the proposed program, the detailed organization will be kept very flexible, so that it can respond rapidly to the changing requirements of the program. This will be particularly important in the early phases of the work, when a close working relationship with the Western Development Division is of critical importance.

Biographies of some of the key personnel available for this program are given in Appendix A.

[redacted] ~~CONFIDENTIAL~~ 137

PRIORITY X AF AFDRD-SS 47017 UNCLASSIFIED

COMDR, WDD, INGLEWOOD, CALIFORNIA

COMDR, ARDC, BALTO, MARYLAND

~~SECRET~~ FROM WDTR 2-2-E FOR RDZGW PERSONAL FOR GENERAL POWER PLEASE TRANSMIT TO GENERAL PUTT AS SOON AS POSSIBLE PD AT THIS DATE THE MOST LOGICAL APPROACH TO ACHIEVE A WS 117L SATELLITE CAPABILITY FOR GEOPHYSICAL PURPOSES IS REPRESENTED BY THAT PROGRAM DESCRIBED IN WDD LETTER SUBJECT QUOTE FUND REQUIREMENTS FOR WEAPON SYSTEM 117L PROGRAM DATED 21 NOVEMBER 1956 AND WDD LETTER SUBJECT QUOTE PLANNING AND FUNDING REQUIREMENTS FOR WS 117L DATED 30 JANUARY 1957 PD THIS PROGRAM IS EXPECTED TO ACHIEVE AN ORBITAL CAPABILITY ON THE SCHEDULE INDICATED IN WDD LETTER OF 30 JANUARY 1957 PD ON THIS PROGRAM THE FIRST ORBITAL CAPABILITY IS CURRENTLY SCHEDULED IN OCTOBER 1959 CMM HOWEVER CMM IT IS POSSIBLE THAT THE FIRST TWO TEST LAUNCHINGS PAREN IN 1958 PAREN COULD BE ORBITAL ATTEMPTS WITH A LOW ORDER OF CONFIDENCE PD PARAGRAPH THE FOLLOWING LETTERED PARAGRAPHS REFERENCE QUESTIONS A THROUGH D OF THE REFERENCED TWX CLN QUESTION A PD THE COSTS TO DEVELOP A SATELLITE NOSE CONE FROM THE PRESENT STATE OF

WDTR

Lt. Colonel Q. A. Riepe
1243

1

for

/s/ QUENTEN A. RIEPE
Lt. Col., USAF
B. A. SCHRIEVER
Major General, USAF
Commander

9
Feb 1957

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INTERVALS: NOT AUTOMATICALLY
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WDTR 57-33

[redacted]

COMDR, WDD, INGLEWOOD, CALIFORNIA

DEVELOPMENT CMM BUT NOT INCLUDING THE LAUNCHING OF THE SIX IGY ORBITAL NOSE CONES ARE CLN

	TOTAL(MILLION $)
AIRFRAME	8.30
PROPULSION	10.13
AUXILIARY POWER	3.45
GUIDANCE AND CONTROL	5.20
GROUND SPACE COMMUNICATION	11.90
DESIGN GEOPHYSICS	1.40
EIGHT SM 65 BOOSTERS	19.00
LAUNCH CREW COST	2.00
MOD. LAUNCH FACILITIES AFMTC	.25
TRACKING NET FACILITY	4.60
TOTAL COST TO ACHIEVE ORBITAL CAPABILITY	66.23

THESE COSTS DO NOT INCLUDE THOSE R&D COSTS NECESSARY TO MODIFY THE WS 117L FOR GEOPHYSICAL PURPOSES SINCE THESE REQUIREMENTS ARE NOT KNOWN CMM AND DO NOT INCLUDE THE COST OF DEVELOPMENT CMM FABRICATION AND TEST OF THE GEOPHYSICAL INSTRUMENTATION PD QUESTION B PD THE ORBIT OF THE GEOPHYSICAL SATELLITE WOULD BE A THREE HUNDRED MILE ALTITUDE LOW LATTITUDE PAREN THIRTY FIVE DEGREES NORTH TO THIRTY FIVE DEGREES SOUTH MAXIMUM LATTITUDE PAREN ELLIPTICAL ORBIT WITH ECCENTRICITY OF POINT ZERO ZERO ONE PD QUESTION C PD ESTIMATED TOTAL COSTS OF THE GEOPHYSICAL PROJECT FOR SIX ORBITAL LAUNCHINGS ARE CLN

[redacted]

CONFIDENTIAL

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	TOTAL (MILLION $)
DEVELOPMENT COSTS (PARAGRAPH A)	66.23
SIX SM 65 BOOSTERS	14.40
SIX SATELLITE NOSE CONES (LESS GEOPHYSICAL EQUIPMENT)	9.00
LAUNCH CREW COSTS	1.50
TOTAL COST	91.13

IT IS ASSUMED THAT THE COSTS OF DEVELOPMENT AND FABRICATION OF GEOPHYSICAL EQUIPMENT CMM IGY PERSONNEL TRAINING AND IGY EQUIPMENT TECHNICIANS PARTICIPATING IN LAUNCHINGS WOULD BE BORNE BY THE VANGUARD PROGRAM PD QUESTION D-1 PD ALL LAUNCHINGS IN THE TEST VEHICLE PROGRAM TO ACHIEVE ORBITAL CAPABILITY USE THE SM 65 AS A ~~BOOSTER PD THE COSTS FOR THIS TEST PROGRAM ARE ILLUSTRATED IN PARA~~ GRAPH A PD QUESTION D-2 FUNDS REQUIRED FOR SIX SM 65 BOOSTERS ARE ELEVEN POINT FOUR ZERO MILLION AND FUNDS FOR GROUND SUPPORT EQUIPMENT ARE THREE MILLION DOLLARS PD TOTAL COST IS FOURTEEN MILLION FOUR HUNDRED THOUSAND DOLLARS PD QUESTION D-3 PD FUND BREAKDOWN FOR SIX SATELLITES BASED ON PAYLOAD OF ONE THOUSAND FIVE HUNDRED POUNDS IS NINE MILLION DOLLARS PD THE COSTS OF THE GROUND SUPPORT EQUIPMENT FOR THE NOSE CONE ARE PART OF THE COSTS CITED IN PARAGRAPH A PD THE ABOVE COSTS DO NOT INCLUDE THE GEOPHYSICAL INSTRUMENTATION OR THE COSTS OF GROUND SERVICING AND TEST EQUIPMENT FOR THE GEOPHYSICAL PAYLOAD PD QUESTION D-4 PD THE ATLAS BOOSTED WS 117L SATELLITE CANNOT BE LAUNCHED FROM PRESENT OR MODIFIED VANGUARD FACILITY PD LAUNCHING THE WS 117L SATELLITE ON ANY IGY

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PROGRAM WILL CAUSE INTERFERENCE WITH THE ICBM PROGRAM PD WHETHER THIS DEGREE OF INTERFERENCE WOULD BE ACCEPTABLE WOULD DEPEND UPON STATUS OF THE ICBM PROGRAM AND RELATIVE PROGRAM PRIORITIES PD MODIFICATION OF SM 65 LAUNCH FACILITY AT AFMTC IS A PART OF THE PLANNED WS 117L PROGRAM AND COSTS ARE ESTIMATED AT TWO HUNDRED FIFTY THOUSAND DOLLARS PD QUESTION D-5 PD LAUNCH FACILITY OPERATIONAL COSTS PAREN DEFINED AS COSTS INDICENT TO BASE OPERATION AND MAINTENANCE PAREN FOR AN EIGHTEEN MONTH PERIOD ARE NOT AVAILABLE AT THIS TIME PD QUESTION D-6 PD THE VANGUARD QUOTE MINITRACT QUOTE TRACKING SYSTEM CAN BE UTILIZED IF DESIRED CMM BUT THE LOW ORDER DATA ACQUISITION CAPABILITY OF THE QUOTE MINITRACK QUOTE SYSTEM IS NOT COMPATIBLE WITH THE HIGH VOLUME DATA GATHERING CAPABILITY OF A ONE THOUSAND FIVE HUNDRED POUND GEOPHYSICAL PAYLOAD PD THE COST SUMMARY TO ACHIEVE TRACKING AND DATA ACQUISITION COMPATIBLE WITH A ONE THOUSAND FIVE HUNDRED POUND GEOPHYSICAL PAYLOAD IS CLN

COST ITEM	MILLION $
DEVELOPMENT OF GROUND SPACE COMMUNICATIONS INCLUDING TRACKING AND DATA ACQUISITION EQUIPMENT	3.60
EQUIPMENT PROCUREMENTS	8.30
TRACKING AND DATA ACQUISITION FACILITIES	4.60
TOTAL	16.50

QUESTION D-7 PD OPERATING COSTS PAREN DEFINED AS COSTS INDICENT TO BASE OPERATION AND MAINTENANCE PAREN FOR TRACKING AND DATA ACQUISITION STATIONS FOR EIGHTEEN MONTH PERIOD ARE NOT AVAILABLE AT THIS TIME PD

QUESTION D-8 PD ORBIT COMPUTER EQUIPMENT IS AN INTEGRAL PART OF THE TRACKING AND DATA ACQUISITION STATIONS AND COSTS OF COMPUTER EQUIPMENTS ARE INCLUDED IN COSTS CITED IN D-6 PD PARAGRAPH THIS OFFICE BELIEVES A WDD SATELLITE EFFORT DURING THE IGY WOULD INTERFERE WITH ACHIEVING THE ICBM PROGRAM AT THE EARLIEST DATA PD HOWEVER CMM EARLY DEMONSTRATED SUCCESS IN THE XSM 65 PROGRAM WOULD ENHANCE THE POSSIBILITY OF REALIZING AN EARLIER ORBITAL RECONNAISSANCE CAPABILITY PD IF WDD IS TO BE DIRECTED TO UNDERTAKE THIS PROJECT CMM IT IS RECOMMENDED THE DIRECTIVE INCLUDE THE CONDITION THAT THE EARLY DEVELOPMENT OF THE SATELLITE CAPABILITY FOLLOW THE XSM 65 BOOSTER DEVELOPMENT CLOSELY DASH NOT CONCURRENTLY DASH EXCEPT IN NOW INTERFERENCE AREAS PD IT IS ALSO REQUESTED THAT FUNDING BE PROVIDED OTHER THAN FROM THE ICBM PROGRAM PD MANPOWER SPACE REQUIREMENTS OVER AND ABOVE PRESENT AUTHORIZATIONS WILL BE DETERMINED AFTER BETTER DETERMINATION OF THE PROBLEM PD

Memorandum for the Record

11 February 1957

Subject: Telephone Call from Mr. Jack Carter, Palo Alto, to General Ritland

Mr. Carter brought up a problem which was previously discussed with General Ritland having to do with Lockheed's program funding. Mr. Carter discussed this with Colonel Riepe early this morning. He stated that they are now up against the problem of "what to plan on." They have been planning their program on the basis of a Development Plan which indicates substantial sums of money and they are well aware of the fact that it is too high. He wanted some advice as to what they should do this year.

He suggested to Colonel Riepe that they should take some figures on a calendar year basis which are higher than, but not too far from the money already set up in the budget... then lay out a program and start working on manpower. Assuming that they would spend $15M this calendar year -- spend what they have plus what is in the budget for '58 and 50% more in calendar year '58 bringing it to 22½. This would take in the first half of '59. This amounts to ~~something like 17½ for '58 and '59 total based on the present budget.~~ This would require that a small amount of procurement money be injected during '58. They hope for some $2 or 3M at the end of this FY. This will keep their program going at a proper rate and is big enough so that they can accelerate at any time if necessary. Colonel Riepe approved of this planning.

Mr. Carter stated that they are putting in a plan that is a little bit more than they know they have got. This is a plan for a minimum level of effort from which they can expand. They must do some financial forecasting, manpower and facilities planning on their own. This amounts in the aggragate, between now and 1960, calendar years 1957, 58, and 59, to total expenditures of about $70M. They can get by with $3M of procurement money and for the next FY, about $10M procurement money.

General Ritland requested that Mr. Carter continue to work through WDD and he will send in a letter confirming the above so that comparisons with WDD figures can be made.

VB

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COPY

11 February 1957

AMC(BMC)

MCPTS/ESS/jbp

Lockheed Aircraft Corporation
Attn: Mr. Carl Hagenmaier
Missile Systems Division
Van Nuys, California

Subject: Contract AF 04(647)-97

Gentlemen:

Your Management Information Report dated 28 January 1957 pertaining to the subject contract has been received.

It is noted that your project commitments and invoicing thru 30 June 1957 amount to $13,700,000.00. The contract as presently funded provides for a maximum $3,000,000.00, and an additional funding action, which is in process, provides for an additional $5,563,000.00, or a total of $8,563,000.00.

The above amount represents the total funding on this contract thru 30 June 1957. It is accordingly requested that your Management Information Report reflect the available funds, and the Contractor is cautioned that any commitments and invoicing beyond the above-mentioned amount can be at his own risk only.

In the event additional funds are made available within FY 57, you will be immediately advised to that effect and a re-scaling of the fund projection could take place at that time.

Sincerely,

cc: Mr. McLachlin, ACO

EUGENE S. SILBERMAN
Contracting Officer

WDGE

19 February 1957

MEMORANDUM FOR THE RECORD

SUBJECT: Phone Call Between Myself and Colonel Ahola - 19 February

1. Congressional Committee Briefing. Colonel Ahola stated that the briefing for the Mahon Committee is now scheduled for 1000 on Tuesday, 26 February.

2. 117L Funding. Colonel Ahola stated that no additional funds would be made available out of FY 57 funding for the 117L. He stated that the Air Council had deferred decision on this to the Secretary of the Air Force and he had made the decision not to put any additional FY 57 funds in the program. Colonel Ahola stated that another look would be taken at the funding program in April 1957 as regards FY 1958 funding. This information has been relayed to Colonel Oder.

3. Committee Room for Congressional Briefing. Colonel Ahola advised that it was planned to use Room F16 in the Capitol for briefing the Mahon Committee. He will actually inspect this room to insure that facilities for training aids are available as earlier requested by Major Stokes.

4. McCorkle's Statements. Colonel Ahola wanted to know if the two papers from AFCGM, one containing a statement of what McCorkle will give to the Mahon Committee and another containing statements McCorkle plans to make before the Nugent Group, have been delivered to General Schriever. These were handcarried to WDD by Lt Colonel Perry.

J. L. HAMILTON
Lt Colonel, USAF
Executive Officer

Copies furnished
General Schriever
General Ritland

C O P Y

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[redacted]

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
Washington 25, D. C.

6 Mar 1957

SUBJECT: (U) Planning and Funding Requirements for WS 117L

TO: Commander
Air Research and Development Command
Post Office Box 1395
Baltimore 3, Maryland

1. Reference is made to your 1st Indorsement dated 5 Feb 57 to the Western Development Division letter of 30 Jan 57, subject as above.

2. Fiscal Year 1957 P-100 and P-200 funds are already over-programmed. Items that have been retained in the present program represent critical support of the active forces. ~~WS 117L, along with other inadequately funded programs,~~ has recently been reviewed at the highest level and the decision made to make no changes in the program structure at this time.

3. This headquarters does not concur with the Western ~~Development Division interpretation of the guidance from~~ this headquarters as outlined in paragraph 2 of their basic letter. The guidance, as previously presented, was promulgated for the purpose of emphasizing component development to insure a greater expectation of success when launchings are undertaken. The Research and Development Flight Schedule proposed in the Western Development Division basic letter of 30 Jan 57 shows no significant change over the flight schedule published in the Development Plan dated 2 Apr 56. Your staff is familiar with the Secretary's views in this regard and that resultant definite slow down is in order. Request your amended Development Plan, to be published in the near future, indicate no orbital testing prior to January 1960.

4. WS 117L must proceed with the ten million of P-600 funds presently available. Another review will be made in April to determine if 4.67 million of P-100 and 4.02 million of P-200 funds can be obtained for FY 1957. For your information the estimates under consideration for FY 1958 are as follows:

P-100	15.0
P-200	10.0
P-600	10.0

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5. It is envisioned that this development will be conducted along conventional lines, which dictates the need for the establishment of a WSPO within Western Development Division.

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/s/ D. L. Putt
D. L. PUTT
Lieutenant General, USAF
Deputy Chief of Staff,
Development

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C O P Y

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~~CONFIDENTIAL~~

Hq USAF, 6 Mar 57, Subj: (U) Planning and Funding Requirements for WS 117L

RDZGW 1st Ind 13 Mar 57

HQ AIR RESEARCH AND DEVELOPMENT COMMAND, P.O. Box 1395, Baltimore 3, Md

TO: Commander, Western Development Division (ARDC) ATTN: WDT, P.O. Box 262, Inglewood, California

1. Basic correspondence is forwarded for your information and necessary action. Your attention is invited to the last sentence of paragraph 3, which requests that the amended Development Plan indicate no orbital testing prior to January 1960. ~~(SECRET)~~

2. Request action be initiated to establish a WSPO within WDD concurrently with receipt of P-100 and P-200 funds. (UNCL)

for /s/ E. A. Kiessling
DON R. OSTRANDER
Brigadier General, USAF
~~Assistant for Guided Missiles Systems~~
Deputy Commander/Weapon Systems

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~~CONFIDENTIAL~~

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~~CONFIDENTIAL~~

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HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

IN REPLY ADDRESS BOTH COMMUNICATION AND ENVELOPE
TO COMDR, ARDC, ATTENTION FOLLOWING OFFICE SYMBOL
RDZG

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11 March 1957

Lt General D. L. Putt
Deputy Chief of Staff/Development
Headquarters, U S Air Force
Washington 25, D. C.

Dear General Putt,

I recently received this memo from Colonel Asa Gibbs, and I agree with it so whole-heartedly that I'm passing it on to you with the hope that you too will concur.

~~The suggestion that we integrate any follow-on scientific~~ satellite work with the ARS program certainly makes a lot of sense to me. I don't know what the possibilities are, but I certainly feel that it should be pursued.

I also agree with his suggestion regarding organization. I believe that a special office reporting directly to you could do much to pull together and lend emphasis to the many facets of this business, which is so important to the future of the Air Force.

Sincerely,

Don

DON R. OSTRANDER
Brigadier General, USAF
Assistant for Guided Missiles Systems
Deputy Commander/Weapon Systems

1 Incl
Ltr fm USNRL to Gen Ostrander, no subj, dtd 6 Mar 57 w/1 incl

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INTERVALS: NOT AUTOMATICALLY
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~~CONFIDENTIAL~~

AFCGM-A Control No. 669
07-113172A

U. S. NAVAL RESEARCH LABORATORY
WASHINGTON 25, D. C.

IN REPLY REFER TO
4107:ABG:aak

6 March 1957

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MEMORANDUM

From: Colonel Asa B. Gibbs
To: Brig. Gen. Ostrander

1. Rumors became persistent sometime in the Fall of 1956 that certain scientific elements were considering an extended or continuing scientific satellite program. These rumors could hardly be overlooked since the Vanguard Program had such a marginal chance of success and furthermore, even if successful, would provide only a fraction of the scientific information desired from a satellite vehicle.

2. My considerations of an extended scientific satellite program were based on the following factors:

   a. Practically all of the information which could be obtained from such a program is information which the Defense Department critically needs in various programs and applications.

   b. The expense of conducting an extended program would be great and probably met by sacrificing some weapon systems effort.

   c. A continuing "scientific" program would become corollary and not necessarily an integral step in the logical progression to space flight.

3. The first conclusion reached after a consideration of the factors was that the ARS program should have a Phase I which would be designed to obtain the information which would come out of an extended scientific program. The thinking which developed this conclusion is as follows:

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a. The ARS Program would encounter no international objections in Phase I if it were clearly a scientific exercise.

b. The national economy would be spared the expense of an additional program.

c. The objections of the scientific element to a military program could be overcome by delegating to an NAS Committee the authority to stipulate the scientific experiments.

d. The ARS should provide a vehicle with much greater reliability and capability than the Vanguard or an improved Vanguard vehicle.

e. Since space flight should be a desired role and mission of the Air Force, steps leading to space flight should be under the cognizance of the Air Force. Conducting the extended scientific program by means of a Phase I ARS would insure that this important space flight step be under Air Force management.

4. The second conclusion reached is that the Air Force must establish a policy and an organization to aggressively do everything necessary to insure that the Air Force obtains a predominant role in space travel.

a. For the past ten years work in astronautics has either been so technical or so highly classified that only a few Air Force officers have recognized that the future of the Air Force lays in this field. There is no organization in any echelon of the Air Force which has the direct responsibility of recommending policy and guiding the Air Force into a commanding role in astronautics. It must be recognized that other services and scientific elements have displayed an active interest in those projects associated with space travel. The Army has within the ABMA an element directly concerned with obtaining for the Army any project which can be recognized as one of the steps on the road to space travel. The Navy has a similar element in ONR. The Air Force responsibility is scattered and an integrated effort is not possible in the present organization. The initiative and policy in this matter should come from the top because of the role and mission aspect. The organization for accomplishment already exists in the WDD, ARDC, but this organization must have policy and guidance. There should be established within the DCS/D an office with cognizance over astronautics. This office should not be under the Asst C/S for G.M. because the Asst C/S should be concerned only with weapon systems.

5. Rumors referred to in paragraph 1 became fact with the publication of a letter by R. W. Porter, Chairman, Technical Panel on the Earth Satellite, dated 7 January 1957. (Incl 1). Clearly Dr. Porter recommends a scientific program directed by civilian scientists. The cost estimate of $130 million dollars is, in my opinion, less than half of what such a program would cost. A more realistic figure would be near $300 million. I believe this amount of money is too great to obtain only a purely scientific research program when the same end results could be obtained within the ARS program. The program as proposed is being very favorably received in scientific circles at a high level. Therefore, it is imperative that the Air Force initiate action immediately to establish a policy and an organization to properly cope with this problem.

Asa B. Gibbs
ASA B. GIBBS
Colonel, USAF
Program Officer

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NATIONAL ACADEMY OF SCIENCES
United States National Committee
for the
International Geophysical Year 1957-58

January 7, 1957

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Dear Dr. Kaplan:

At the last meeting of the Committee in Washington on December 5, 1956, the Technical Panel on the Earth Satellite Program was requested to study and report on a continuing program of scientific research using earth satellite vehicles. This program would consist of thirty attempted launchings spread over a period of approximately five years. The first, second, and third stage boosters would be similar to those now being constructed for the IGY program, but design improvements would be incorporated in "block" changes as rapidly as permitted by the state of the art. The assigned task, then, is to estimate how much improved vehicular performance might be obtained during the course of such a program and to study the ways in which such increased performance might be exploited scientifically.

Inasmuch as it did not appear to be feasible to call the entire Panel together again before early February, and inasmuch as it was indicated that a report on this study should be available not later than January 10, 1957, I have asked for assistance from several members of the Panel and of the Working Group on Internal Instrumentation as a sort of ad hoc task force. These persons include Dr. Van Allen, Dr. Newell, Dr. Kellogg, Dr. Rosen and Dr. Spitzer. The attached report should be considered as a summary of the constructive thinking of these persons rather than as an official report by the Technical Panel. I am sending copies of the report immediately to all members of the Panel and of the Working Group so that they may register any objections or dissent, if they so desire.

Although we were not asked to comment on organizational considerations, my colleagues have asked me to pass on to you the opinion that for an extended scientific program of national scope, such as appears to be contemplated here, it is important that clear civilian authority (as by the National Science Foundation) be established for the planning and execution, preserving, however, any essential cooperation of the military services. In particular, it seems important to establish at the very beginning of the program a single comprehensive budget which will include all expenditures in connection with the program, including those to be made by organizations within the military establishments.

I sincerely hope that the attached information will satisfy the purposes outlined by Dr. Berkner and yourself.

Sincerely,

/s/ R. W. Porter

R.W. Porter, Chairman
Technical Panel on the Earth Satellite

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WDTR

MAR 22 1957

MEMORANDUM FOR: Colonel Terhune

SUBJECT: Trip Report - Colonel Oder and Lt. Colonel Riepe to Naval Research Laboratory 12 March 1957 and Pentagon

1. The purpose of the visit as arranged by Colonel A. B. Gibbs Air Force representative to Project Vanguard at the Naval Research Laboratory, was to exchange information of mutual interest between the IGY Satellite program and WS 117L. Those in attendance were:

Colonel Frederic C. E. Oder - WDD
Lt. Colonel Quenten A. Riepe - WDD
Lt. Colonel Paul E. Worthman - ARDC
Lt. Colonel Victor M. Genez - ARDC
Colonel Asa B. Gibbs - USAF - Rep. IGY
Lt. Colonel J. O'Hea - USA - Rep. IGY
Captain (USN) P. Horn - NRL
Mr. J. W. Siry - NRL
Mr. J. P. Hagen - NRL
Mr. F. Ferguson - NRL
~~Mr. M. W. Rosen - NRL~~
Mr. H. E. Newell, Jr. - NRL

2. The meeting convened in Mr. Hagen's office at 0900. The following topics were covered:

Vanguard Program - Management Problems - Mr. Hagen
Vehicle - Problems and Approach for Solutions - Mr. Rosen
Guidance and Control - Mr. Ferguson
Orbital Computation and Trajectories - Mr. Siry
Scientific Experiments - Mr. Newell
WS 117L - Approach-purpose-R&D Status - Colonel Oder

3. An interesting fact of the IGY program came about as a result of questioning Mr. Hagen and Mr. Rosen on the present development status and projected schedule. They have now slipped six months in their development program. Have not flight tested any of the major components of the system, and yet intend to "make-up" the time already lost plus any additional by compressing the flight schedule to still have an end date of December 1958. The current program calls for six satellite trys in the IGY, carrying four "hard-core" geophysical experiments. Mr. Hagen stated that the NRL considered this project requirements fulfilled if one of the six established a vehicle on orbit.

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5. Execution of this plan would place a very small burden upon WDD, could lead to generation of good feelings between Navy and Air Force, and incidentally, ease the burden of converting Launch Pad 18A and Blockhouse 18 to WS-315A use at the conclusion of VANGUARD firings since instrumentation and control equipment would be largely that required for operation of the THOR missile.

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Edward N. Hall

EDWARD N. HALL, Colonel, USAF
Director, Weapon System 315A

2 Incls.
1. Cy Memo for BAS dtd 19 Apr 57 (S) WD 57-01714 - all under [illegible]
2. Cy RW Study, dtd 1 Apr 57, Proposed Use of IRBM as Booster for Multi-Stage Vehicles (S) WD 57-01959 W/D

GM67. 3-49
Copy 1 of [redacted]

H. R. Lawrence

A. F. Donovan
P. Dergarabedian

1 April 1957

Proposed Use of IRBM as Booster For Multi-Stage Vehicles

J. B. Kendrick

The accompanying data sheets cover the work done to date on three new designs using the IRBM as booster for the following multi-stage vehicles:

Test Vehicles

1. Two-Stage Re-entry Test Vehicle M = 23 Payload 500 pounds.
2. Two-Stage Test Vehicle M = 25 Payload 0 pounds.
3. Four-Stage Test Vehicle M = 29 Payload 90 pounds.

Satellites

1. Two-Stage Vehicle. Payload 50 pounds. Orbit at 190 mi. altitude.
2. Three-Stage Vehicle. Payload 200 pounds. Orbit at 300 mi. altitude.

These combinations of vehicles are attained by uniting the Thor and the RTV in various stages. A brief study of the interstage connection between Thor and RTV reveals no major modifications needed to make the connection. The spin-rocket system of the RTV is also utillized in those designs (with streamlined fairings). The Thor guidance system is replaced by a simpler, lighter system for these designs. In view of the simplicity of these modifications, it is expected that the development costs involved in the above proposals will ve very nominal.

The performance and payload capabilities of these arrangements seem to justify further consideration of their potential uses. Please let us know if we can be of further assistance in the development of the idea.

JBK:gg

J. B. Kendrick

Atch to Doc
#151

SUMMARY

1. The present proposal is to assemble multi-stage rocket vehicle using the IRBM "Thor" as first stage or booster, and the T-65 as second stage. The plan appears to be feasible without extensive changes to the booster or to the T-65 (see Figs. 1 and 2). The nose cone of the Thor may be removed and the interstage adaptor attached at Sta. 50. The standard T-65 motor and spin rocket installation as used on the RTV are assumed for the second stage. Some weight saving modifications to the guidance and control equipment aid power supply are assumed, and specified.

2. The payload-velocity-range characteristics of the resulting two-stage vehicle are as follows:

Payload, lbs.	Max. Velocity, ft/sec.	Max. Range, n mi.
0	25,400	-
500	23,300	5,300
1,000	21,500	4,150
2,500	18,700	2,800

3. The bending moment imposed on the interstage connection by the sudden application of 3° motor tip at burnout of Stage 1 is about 500,000 in.lbs applied load. This imposes a stress on the booster at Sta. 141 of 2500 psi and on the T-65 motor of 6000 psi. These moderate stresses are higher than any gust load condition would impose, but seem to indicate that the structural problems involved in the proposal would not be critical.

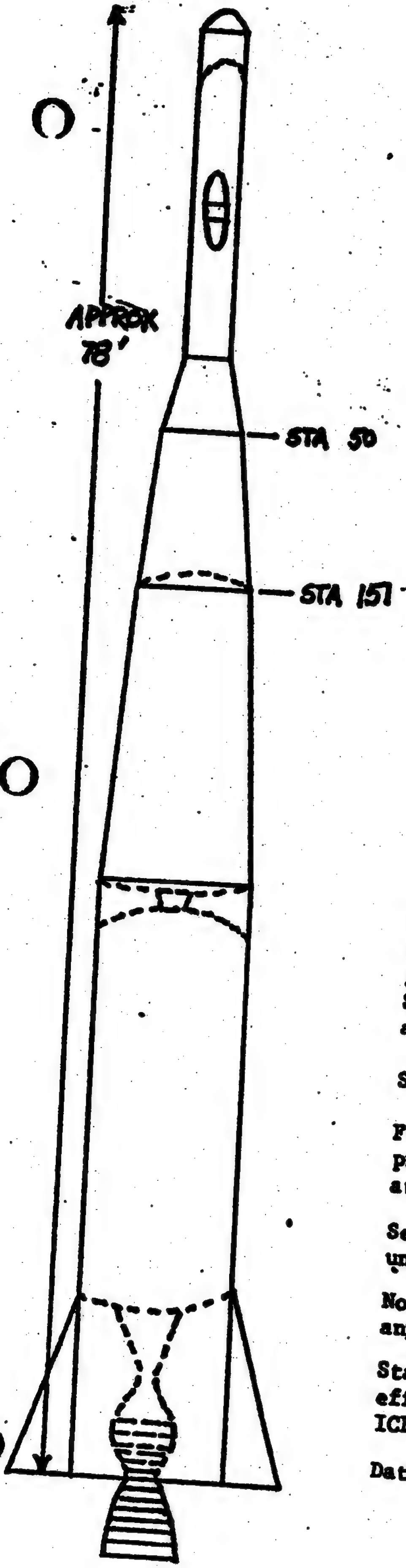
4. Given the IRBM booster and the T-65 motor with spin-up rocket installation as used on the RTV, the cost of assembling the two-stage vehicle is seen to be very nominal. In fact, this is the lowest cost rocket vehicle having a range of about 5000 miles which has come to the author's attention.

5. In addition to its suggested use as a Re-entry Test Vehicle for tests on a half-size nose cone of the ICBM, many other applications may be devised, such as a weapon, decoy or reconn. vehicle. By virtue of the ease of adaptability from available parts, the latter possibilities should be given further consideration. Some interesting possibilities can also be obtained by use of three-and-four-stage combinations of available parts.

6. A two-stage satellite vehicle capable of orbiting a payload of 50 lbs. can be obtained, by modifications to the Thor guidance, autopilot and power supply, and be use of an 18:1 expansion ratio nozzle on the T-65. With similar modifications, a three-stage satellite capable of carrying a payload of 200 lbs. can be obtained.

7. If a four-stage vehicle is assembled with the IRBM booster and all three stages of the RTV, a Mach number of M = 29 can be attained with a payload of 90 obs. Using the low-thrust attitude-control system after Stage 1 burnout, it is possible to provide re-entry angles of 20 degrees or less with range values of about 2000 miles.

FIGURE 1



PROPOSED TWO-STAGE ROCKET VEHICLE

USING IRBM BOOSTER

WITH T-65 SECOND STAGE

Payload	500 lbs
Maximum Range	5,300 n mi
Stage 1 Burnout Altitude	210,000 ft
Stage 1 Burnout Velocity	12,600 ft/sec
Stage 2 Burnout Altitude	400,000 ft
Stage 2 Burnout Velocity	23,300 ft/sec
Apogee	4×10^6 ft.
Re-entry Angle	20./ degrees from horizontal

Plan of Operation

Fire Stage 1. Climb vertically for 10 seconds, then programmed turn to angle of 20 degrees using programmer and autopilot mounted in Stage 1. Conventional Stage 1 controls with vernier & anti-roll to stage burnout, and for 6 seconds thereafter.

Separate and fire spin-up rockets to get 4 revs/sec.

Fire Stage 2, after separation and spin-up initiated by programmer. Spin velocity will maintain constant attitude to about 1 degree.

Separate nose cone by pyrotechnic or mechanical expulsion unit, initiated by time fuze, after burnout of Stage 2.

Nose cone has no attitude control; hence will re-enter at any angle and will tend to oscillate.

Stability, damping, temperatures, pressures and radiation effects can be measured under conditions comparable to ICBM re-entry.

Data can be telemetered to ground stations.

TWO-STAGE TEST VEHICLE PROPOSAL

The present proposal is to assemble a two-stage rocket vehicle using an IRBM as booster, with a standard T-65 motor as the second stage. This two-stage vehicle might be used as a Re-entry Test Vehicle, capable of carrying an ICBM nose cone (one-half size) weighing 500 lbs., with a re-entry Mach number of about M - 23.

The basic Thor vehicle is not changed except to remove the nose cone and replace it with an adaptor which supports the second stage (see Fig. 2). The gross weight of the two-stage vehicle is about 5000 lbs. greater than the orignal Thor, but the burnout velocity of Stage 1 is still about 12,600 ft/sec. with the two-stage missile carrying 500 lbs. payload. The original guidance and autopilot system is assumed to be repalaced by a lighter system for such tests.

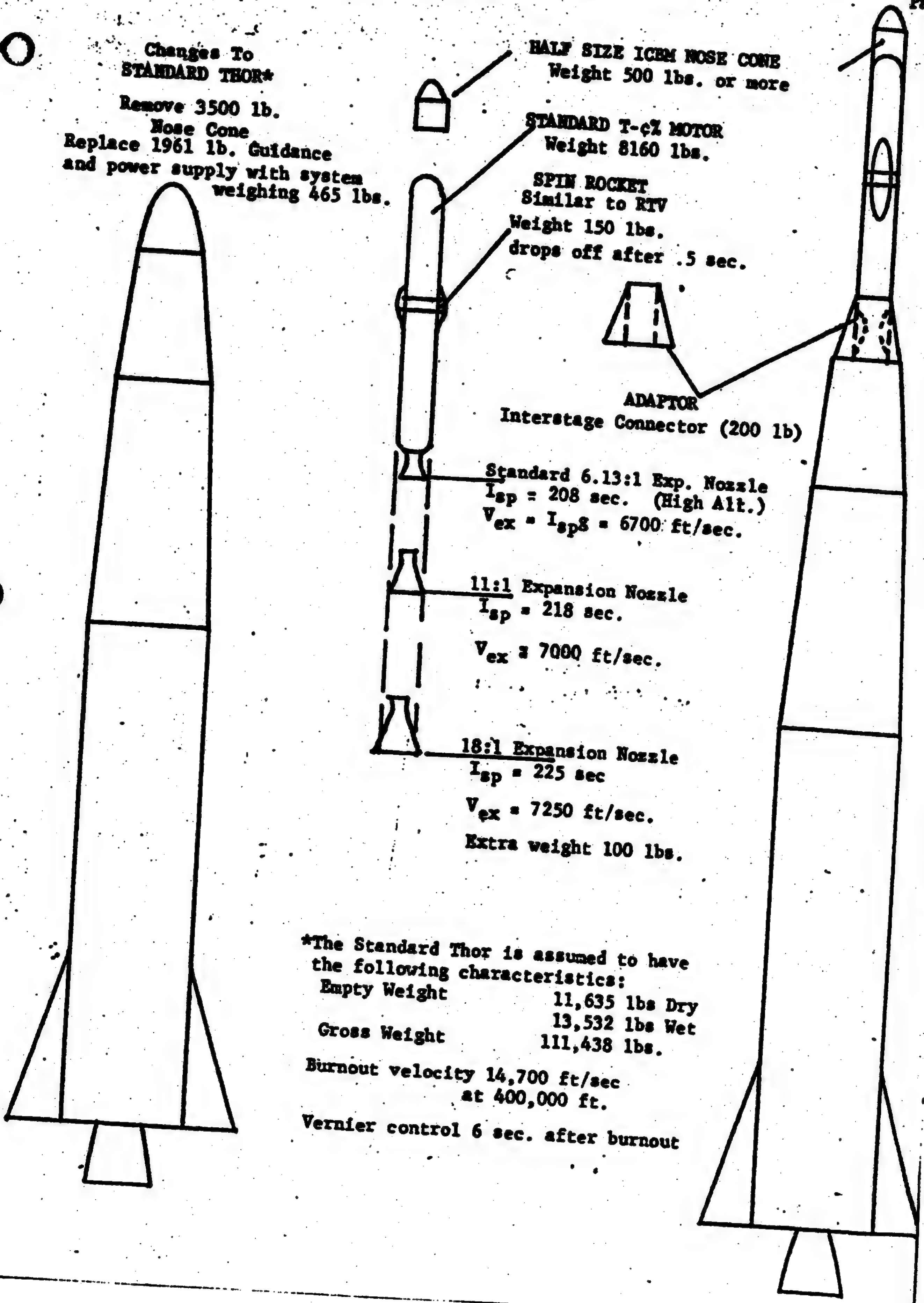
The flight plan (see Fig. 1) is to use the conventional IRBM controls and anti-roll & verniers through the boost period and for 6 seconds thereafter, then to separate and fire the second stage immediately. The RTV spin rocket system gives 4 revs/sec., which provides stability and attitude control during the second stage burning period. After burnout the nose cone separates and continues on trajectory without attitude control. Its shape is believed to provide sufficient stability to cause it to align itself with the flight direction on re-ent Temperature effect and stability characteriestics may be measured and telemetered to the ground.

The ICBM nose cone weighing 3500 lbs. consists of approximately fifty (50) percent warhead and an equal amount of shell and structure. The same deceleration would be obtained on a model in which the drag/weight ratio was held constant. For a half size model, the drag is reduced by a factor of four due to the reduction in size, and the weight should also be reduced by a factor of four, to give the same deceleration. Hence, the weight of the half size model would be 875 lbs., or of a one-third size model 390 lbs. The weight of a scale model varies as the cube of the scale; hence the half size model would weigh 1/8 of 1750 lbs. or 220 lbs., while the 1/3 size model would weigh only 65 lbs. Ample weight is then available for extra skin gage and for telemetering equipment.

The re-entry angle can be varied from values of the order of 20 degrees corresponding to the ICBM to much higher angles, by adjusting the autopilot programmer during the launch phase. The similitude conditions to be expected for the proposed Re-entry Test Vehicle are as follows:

Similitude Condition	ICBM	Re-entry Test Vehicle 1/2 Size	1/3 Size
Re-entry Velocity, ft/sec	23,000	23,300	23,300
Re-entry Angle, degrees	18	18 - 90	18 - 90
Reynolds Number	R_o	1/2 R_o	1/3 R_o
Max. Deceleration. "g's"	60	60	60
Heating Period, sec.	t_o	t_o	t_o

STEP IN BUILD-UP OF TWO-STAGE VEHICLE



Changes To
STANDARD THOR*

Remove 3500 lb.
Nose Cone
Replace 1961 lb. Guidance
and power supply with system
weighing 465 lbs.

HALF SIZE ICBM NOSE CONE
Weight 500 lbs. or more

STANDARD T-ç% MOTOR
Weight 8160 lbs.

SPIN ROCKET
Similar to RTV
Weight 150 lbs.
drops off after .5 sec.

ADAPTOR
Interstage Connector (200 lb)

Standard 6.13:1 Exp. Nozzle
$I_{sp} = 208$ sec. (High Alt.)
$V_{ex} = I_{sp}g = 6700$ ft/sec.

11:1 Expansion Nozzle
$I_{sp} = 218$ sec.

$V_{ex} = 7000$ ft/sec.

18:1 Expansion Nozzle
$I_{sp} = 225$ sec

$V_{ex} = 7250$ ft/sec.

Extra weight 100 lbs.

*The Standard Thor is assumed to have the following characteristics:

Empty Weight	11,635 lbs Dry 13,532 lbs Wet
Gross Weight	111,438 lbs.

Burnout velocity 14,700 ft/sec
at 400,000 ft.

Vernier control 6 sec. after burnout

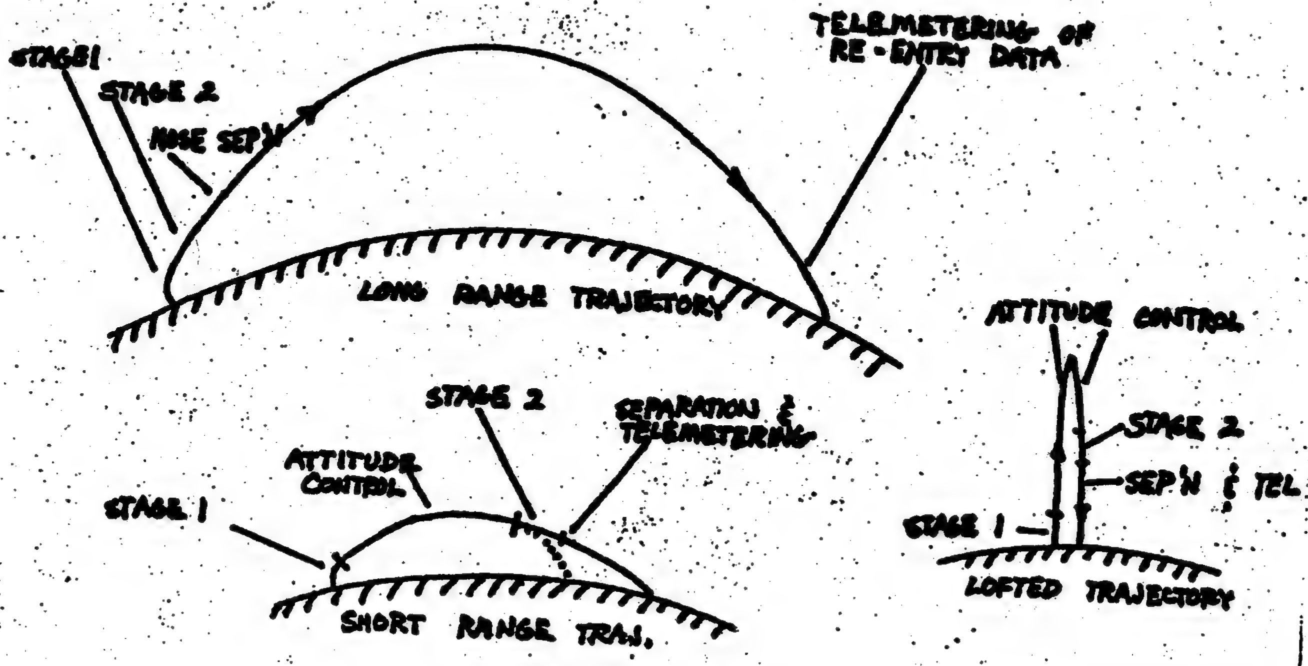
TRAJECTORIES AND GROUND STATIONS

Long Range Trajectories. The two-stage test vehicle can be launched a long range trajectory of about 5300 n. mi. by tipping over to an angle of about 20 degrees near the end of Stage 1 burning period and holding that angle constant during Stage 2 burning period, which is assumed to commence about 6 seconds after Stage 1 burnout. Ground stations for this type of operation may be the same as those planned for the ICBM long range trajectories. The two-stage payload is expected to impact within about 100 miles of the aiming point and its telemetering range during re-entry should be several hundred miles, hence the ICBM ground stations should be within telemetering range of the re-entry trajectory.

Short Range Trajectories. In case it is desired to reduce the range of the test vehicle, one effective method is to fire the first stage, then coast to apogee and beyond using low-thrust attitude-control nozzles, then to fire the second stage on the downward leg, at whatever re-entry angle is desired, and at such altitude that burnout will occur above an altitude of 400,000 ft. This procedure will reduce the range to about 2000 miles for 20 degree re-entry angles.

Lofted Trajectories. By firing the first stage nearly vertical, and delaying Stage 2 firing until the downward leg, the range may be reduced to any small value desired. This technique is feasible by use of low-thrust attitude-control nozzles, utilizing the remaining LOX tank gas pressure. Such lofted trajectories will give rather steep re-entry angles, of course, but such may be desired for some tests. The attitude control may work in two ways:

1. Maintain the missile nose up until ready to fire Stage 2. Then separate, spin-up and fire Stage 2, which points downward.
2. Tip the missile over to nose down attitude. Then separate, spin-up and fire Stage 2. (The latter technique requires gyros capable of operation through a range of about 180 degrees change in attitude.)



WEIGHT SUMMARY AND PERFORMACE ESTIMATE

TWO-STAGE RE-ENTRY TEST VEHICLE WITH SPIN-UP

Present weight empty of IRBM (Dry)	11,635 lbs.		
Residual Propellant	1,897		
Present weight empty of IRBM (Wet)	13,532 lbs.		
Usable Propellant	97,906		
Gross weight of present IRBM		111,438 lbs.	
Items to be removed		-5,461	
Nose cone	3,500		
Structure forward Sta. 151	382		
A-C guidance unit	991		
Autopilot units, supports, batteries	227		
Reduce size of vernier tanks	200		
Items to be added		+465	
Autopilot and programmer	150		
Power supply	115		
Adaptor for T-65	200		
Net weight of Stage 1		106,442 lbs	
Add T-65 and 500 lb. Payload		8,810	(0 lb. Payl 8,310
Model payload and fitting 500			
T-65 with standard nozzle 8160			
(including 6978 lbs. propellant)			
Spin-up rocket installation 150 (drop off after .5 sec)			
Launch weight of Stage 1		115,252 lbs.	
Less usable propellant		97,906	
Empty weight of Stage 1		17,346 lbs.	16,846
Estimated Burnout Velocity - Stage 1 **	270,000 ft	12,600 ft/sec	12,800
Velocity increment - Stage 2 = $6700 * \lg\frac{8660}{1682} - 285 =$		10,700	12,600
Estimated Burnout Velocity - Stage 3		23,300 ft/sec (M = 23.9)	25,400 (M = 26.0

$*I_{sp} = \frac{1.309 \times 10}{6978} \times \frac{1.66}{1.494} = 208$; $I_{sp} \times g = 6700$ ft/sec.

(Standard 6.13:1 expansion nozzle)

**dv/dw = -.44 ft/sec/lb. See Fig. 4

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

TWO-STAGE SATELLITE VEHICLE

Present weight empty of IRBM (Dry)		11,635 lbs.	
Residual Propellant		1,897	
Present weight empty of IRBM (Wet)		13,532 lbs.	
Usable Propellant		97, 906	
Gross weight of present IRBM			111,438 lbs.
Items to be removed			-5,461
Nose cone		3,500	
Structure forward Sta. 151		382	
AC guidance unit		991	
Autopilot units, supports, cables		161	
Power converter, supports, batteries		227	
Reduce size of vernier tanks		200	
Items to be added			+485
Autopilot and programmer		150	
Power supply		115	
Adaptor for T-65		200	
Control of attitude - system*.		20	
New weight of booster stage			106,462 lbs.
Add T-65 and Orbiter installation			8,460
Orbiter payload and fittings	50		
T-65 with 18:1 nozzle** (including 6978 lbs propellant)	8260		
Apin-up rocket installation	150		
Launch weight of Stage 1			114,922 lbs.
Less usable propellant			97,906
Empty weight of Stage 1			17,016 lbs.

Estimated Burnout Velocity - Stage 1 12,750 ft/sec@ 275,000 ft 10,750@10^6ft.

Velocity Increment - Stage 2 = $7250^{**} \lg \frac{8310}{1332}$ = 13,250

Earth's Rotational Velocity 1,500

Estimated Burnout Velocity - Stage 2 25,500 ft/sec

Required Orbit Velocity at 10^6ft. (190 mi) 25,400 ft/sec

*Standard vernier system (6 sec. after burnout) continues until altitude is about 350,000 ft. Long duration jetsystem may utilize LOX tank gas to turn body to horizontal and hold it for about five (5) minutes, while coasting to apogee.

$^{**}I_{sp} = \underline{1.309 \times 10^6} \times \underline{1.790} = 225$; $I_{sp} \times g = 7250$ ft/sec.
(18:1 expansion nozzle)

STRUCTURAL CONSIDERATIONS

(See Figure 3)

Case 1. Consider bending moment on interstage connection due to sharp edge side gust of 60 ft/sec., applied at maximum dynamic pressure condition of $q_{max} = 800$ lbs/sq ft., Altitude = 35000 ft., Velocity = 1500 ft/sec.

Change in angle of attack = 60/1500 = .04 rad.

Side force on nose = C_L qS = 2.0 x 800 x 4.9 x .04
= 315 lbs.

Bending moment at rear of Sgt. = 315 x 300
= 100,000 inch lbs. (applied)

Case 2.. Consider bending moment at interstage connection due to suddern application of control on the main motor. One degree tip of main nozzle gives a moment of

$$M_{cg} = \frac{153,000}{57.3} \times 45 = 120,000 \text{ ft lbs/0}$$

Angular acceleration about the center of gravity will be

$$\ddot{c}g = \frac{M}{I} = \frac{120,000}{300,000} = 0.4 \text{ rad/sec}^2\text{/0 (near burnout)}$$

Moment at interstage connection will be

$$M/o = I = \frac{MI^2}{3} = \frac{9000}{3 \times 32} \times 20^2 \times 0.4 = 14,400 \text{ ft lb/o}$$
$$= 172,000 \text{ in lb/o}$$

*Present T-65 is designed for hoisting moment of 505,000 in lb. and hence could take at least 3 degrees of motor tip.

Bending stress on Sta. 151; $f = \frac{My}{I} = \frac{500,000 \times 37}{x 37^3 \times .05}$
= 2500 lbs/sq in

This corresponds to an increase in tank pressure of about 7.5 psi.

Bending stress on rear of T-65 = $\frac{500,000 \times 15.5}{x 15.5^3 \times .125}$
= 6000 lbs/sq. in.

Reaction to resist Bending Moment R = M/d

Where d = 36 in. $R = \frac{500,000}{36} = 14,000$ lbs.

It is simple to carry this load on two rings of adaptor.

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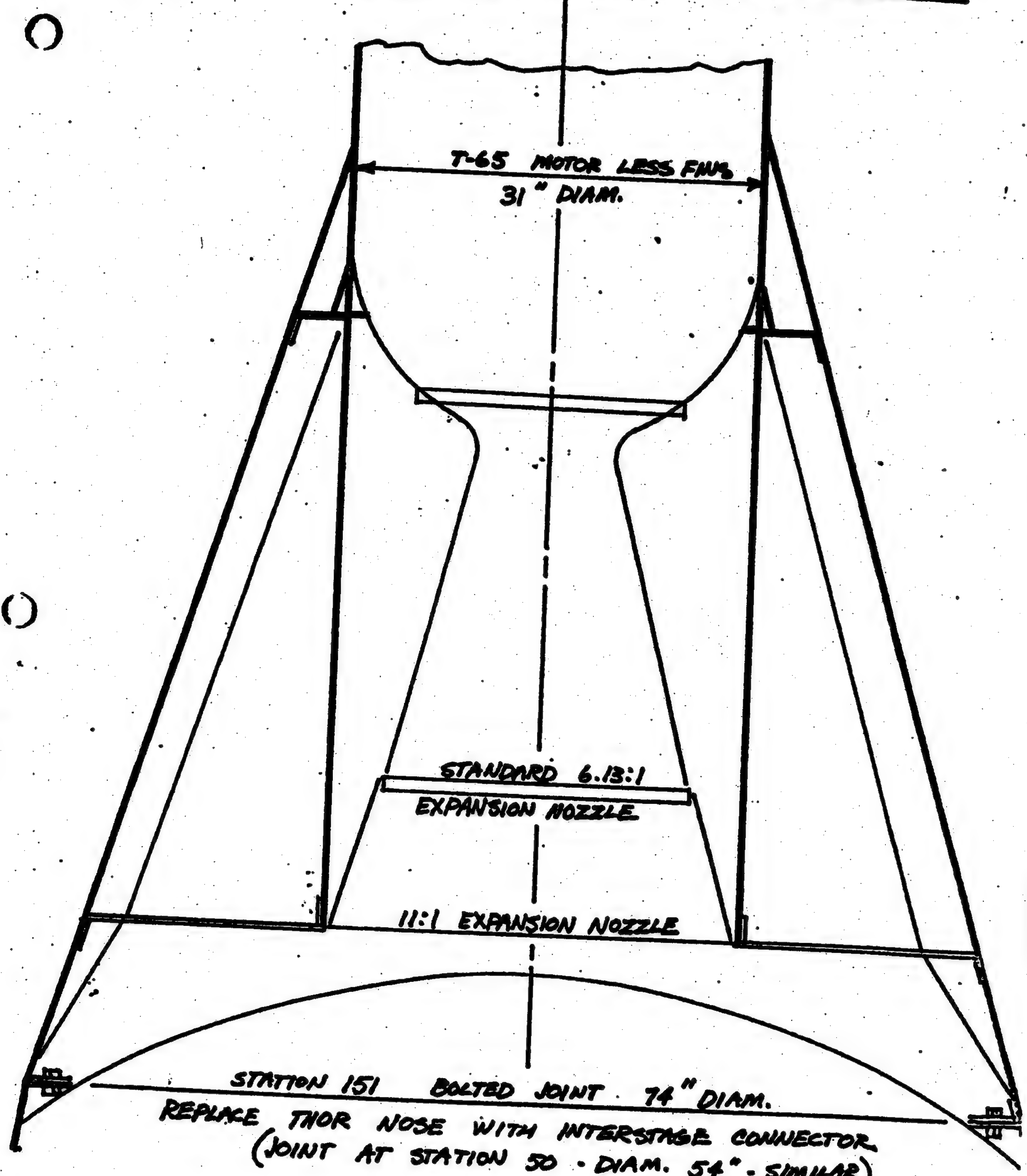
*For further analysis of T-65 load conditions, refer to Thiokol Report SP - 59 "Preliminary Model Spec, Rocket Motor, Solid Prop. T-65, 24-KS-50,000. SP-59". 5 July 55. (Conf.)

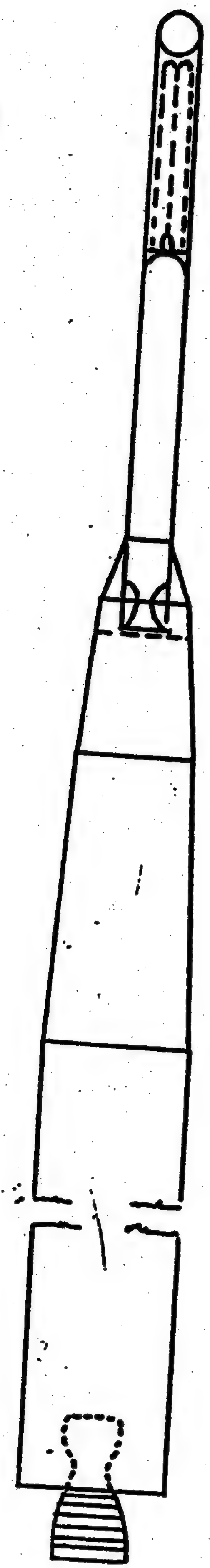
FIG 3

INTERSTAGE CONNECTION - T-65 TO THOR



REPLACE THOR NOSE WITH INTERSTAGE CONNECTOR
(JOINT AT STATION 50 - DIAM. 54" - SIMILAR)

-SEPARATION OF STAGES: REMAINING GAS IN FUEL TANK MAY BE DUMPED INTO CYLINDER BEHIND T-65



PROPOSED THREE-STAGE SATELLITE VEHICLE USING IRBM BOOSTER WITH TWO STAGES OF RTV

Payload	200 lbs.
Stage 2 and 3 weight	9,980 lbs. including payload
Booster burnout velocity	12,050 ft/sec
Stage 2	9,000
Stage 3	5,700
Earth's Rotation	1500 ft/sec
Total Velocity Stage 3	23,930 ft/sec

Plan of Operation

Fire Stage 1. The vehicle then executes a programmed turn to horizontal at apogee, using autopilot. Conventional controls to burnout, with low-thrust vernier to apogee for attitude control.

Separation, Spin-up and Stage 2 Ignition. The second stage is ejected using pyrotechnic or mechanical ejector unit, initiated by programmer on Stage 1. Motion of separation causes spin-up rocket ignition, Stage 2 motor ignition, and initiation of time fuze for Stage 3 ignition.

Stage 3 Ignition. After time fuze ignites Stage 3 it is launched through guide rails attached to empty Stage 2, thus minimizing its dispersion.

Payload Separation. Depending on the purpose of the flight, payload may or may not be separated from its empty rocket case.

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

THREE-STAGE SATELLITE VEHICLE WITH SPIN-UP

Present weight empty of IRBM (Dry)	11,635 lbs.	
Residual Propellant	1,897	
Present weight empty of IRBM (Wet)	13,532 lbs.	
Usable Propellant	97,906	
Gross weight of present IRBM		111,438 lbs.
Items to be removed - Same as p. 7		-5,461
Items to be added - Same as p. 7		-485
Net weight of Stage 1		106,462
Weight of Stage 2		9,980
Satellite Payload	200	
Three Recruit Cluster (including 3 x 263 lbs. propellant)	1,270	1470 Gross Wt. Stage 3
T-65 motor with 18:1 nozzle (including 6978 lbs. propellant)	8,260	
Spin-up rocket installation	150	
Launcher for Stage 3	100	
Launch weight of Stage 1		116,442 lbs.
Less usable propellant		97,906
Empty weight of Stage L		18,536 lbs.

Estimated Burnout Velocity - Stage 1 12,050 ft/sec@255,000ft 7,730 @ 300 mi

Velocity increment Stage 2 = 7250 lg $\frac{9830}{2852}$ =	9,000
Velocity increment Stage 3 = 7400 lg $\frac{1470}{680}$ =	5,700
Earth's rotational velocity	1,500
Estimated Burnout Velocity - Stage 3	23,930 ft/sec

Velocity required to orbit at 300 mile altitude 23,900 ft/sec.

DISPERSION OF STAGE 2

Deviation from direction of launch $= \phi = \frac{M}{Aw^2} \; \frac{\sin a\,wt - a \sin wt}{1 - a}$

where M = unbalanced moment - ft. lbs. (various causes)

A = polar moment of inertia about longitudinal axis - slug ft^2

B = moment of inertia about lateral axis thru cg.

$a = \frac{A}{B}$

w = spin frequency in rad/sec.

Cause 1 = Malalignment of thrust axis 1/4 degree = .0044 rad.

So $M = 50{,}000 \times .0044 \times 12' = 2640$ ft. lbs.

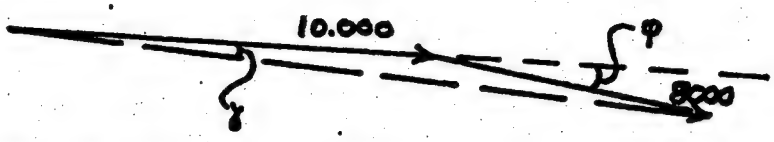
$A = 2 \times \frac{10{,}000}{32.2} \times 1 = 620$ slug ft^2 to 120 slug ft^2 (at burnout)

$B = \frac{10{,}000}{32.2} \times 25^2 = 195{,}000$ slug ft^2 to 39000 slug ft^2

a = .0032 .0032

$w = 2\pi \times 4 - 25$ rad/sec using spin-up rockets.

Then $\phi = \frac{2640}{620 \times 25^2} = .0068$ rad. $= .39^\circ$ .034 rad.



Dispersion angle $= .034 \; \frac{8000}{18{,}000} = .0152$ rad. $= 0.87^\circ$

Cause 2 - Unbalanced mass distribution; i.e. dynamic unblance. The empty motor can be balanced to the order of 10^{-6}rad.

The loaded motor can also be balance to the order of 10^{-6} rad. This cause of dispersion is thus seen to be several orders of magnitude less that Cause 1 above.

Cause 3 - Tip-off from booster. The attitude of the booster is assumed to be held accurately to .001 rad. * Ejection of Stage 2 and spin-up in 0.5 sec. are expected to increase this value to .002 radian; i.e. 45% of Cause 1.

Conclusion: $\Sigma\, y_1 = \sqrt{y_1^2 + y_2^2 + y_3^3 + \ldots\ldots y_i^2}$ is believed to be of the order of 1 degree for Stage 2.

---

*Such guidance accuracy may require heavier equipment than assumed in the weight summary.

DISPERSION OF STAGE 3

Cause 1 - Difference in ignition timing for three (3) rockets. It may be assumed that all 3 rockets ignite, but one of them ignites .005 sec. before the others, thus giving an increment of thrust (say 1/3 of 37,00C lbs) for .004 sec. at moment arm of 3 inches.

$$M \doteq M\frac{\Delta t}{t} = \frac{37,000}{} \times \frac{.005}{1.53} \times \frac{1'}{4} = 30. \text{ ft. lb.}$$

$$A = \frac{2 \times 1770}{32.2} \times 4^2 = 17.5 \text{ slug ft}^2 \text{ to } 8.0 \text{ slug ft}^2$$

$$B = \frac{1770}{32.2} \times 8^2 \quad = 3500 \text{ slug ft}^2 \text{ to } 1700$$

$a =$

.005 .005

$$\phi_1 = \frac{30 \times}{8 \times 25^2} - .0048 \text{ rad.}$$

$$\gamma_1 = .0048 \frac{5200}{23,000} = .0011 \text{ rad.}$$

Cause 2 - 2% difference in thrust of one of three motors

$$M = .02 \times 37,000 \times \frac{1}{4} = 185 \text{ ft. lb.}$$

$$\gamma_2 = .0011 \times \frac{185}{30} = .0068 \text{ rad.}$$

Cause 3 - Malalignment of thrust line of one motor $1/4^\circ = .0044$ rad.

$$M = 37,000 \times .0044 \times 6 = 980 \text{ ft. lb.}$$

$$\gamma_3 = .0011 \times \frac{980}{30} = 0.035 \text{ rad.} = 2^\circ \text{ (Probably less)}$$

Conclusion: $\Sigma Y_1 = \sqrt{(Y_1^2)_1 + (Y_1^2)_2 + (Y_1^2)_3}$ is believed to be of the order of 2 to 3 degrees, according to the above analysis. This will vary as $1/w^2$; hence a slight increase in spin rate would be desirable.

WEIGHT SUMMARY AND PERFORMANCE ESTIMATE

FOUR-STAGE VEHICLE WITH IRBM AND RTV

Present weight empty of IRBM (Dry)	11,635 lbs.	
Residual Propellant	1,897	
Present weight empty of IRBM (Wet)	13,532	
Usable Propellant	97,906	
Gross weight of present IRBM		111,438 lbs.
Items to be removed - Same as p. 7		-5,461
Items to be added - Same as p. 7 -		-485
Net weight of Stage 1		106,462 lbs.
Weight of Stage 2		10,500
RTV 1st Stage 10,500 lbs (less fins) including 6978 lbs propellant plus spin-up rockets 150 lbs. which drop off after .5 sec.		
RTV 2d Stage 1770 lbs. including 3 x 263 lbs propellant		
Launch Weight of Stage 1		116,962 lbs.
Less usable propellant in Stage 1		97,906
Empty weight of Stage 1		19,056 lbs.
Estimated Burnout Velocity of Stage 1		11,800 ft/sec
Velocity increment Stage 2 = 7250 log $\frac{10,350}{3,372}$ - 285 =		7,800
Velocity increment Stage 3 = 7400 log $\frac{1,770}{980}$ =		4,400
Velocity increment Stage 4 = 7400 log $\frac{500}{240}$ =		5,400
Estimated Burnout Velocity - Stage 4		29,400 ft/sec

APPENDIX

METHOD OF COMPUTING PERFORMANCE

The performance of Stage 1 was computed on the 1103 Computer in the same detailed manner as for the IRBM. Four values of burnout weight were used; i.e., the nominal weight of the standard missile and three higher values. Burnout velocity and altitude is plotted in Fig. 4 as a function of burnout weight for the case of 97,906 pounds of usable propellant.

For later stages, the velocity increment is shown in Fig. 5 as a function of mass ratio for various vlues of effective exhaust velocity. The effect of gravity and drag for Stage 2 operation in a long range trajectory was computed on the 1103 Computer, and found to be 285 ft/sec. The velocity increments determined from the chart should therefore be decreased slightly for gravity and drag.

Range as a function of burnout velocity is shown in Fig. 6 for the IRBM family of missiles. The four points computed on the 1103 Computer are distinguished by asterisks.

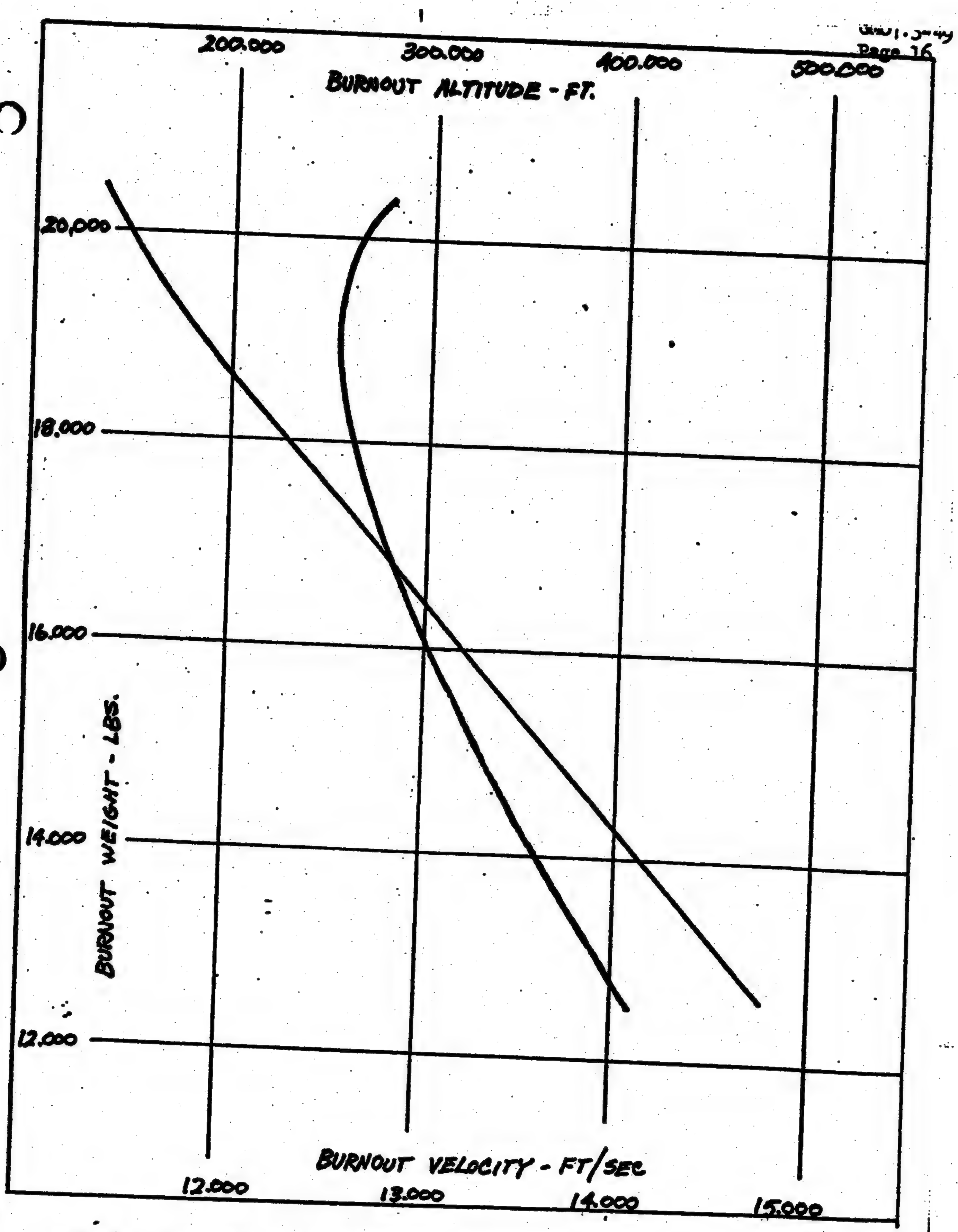


FIG. 4 BURNOUT VELOCITY AND ALTITUDE VS WEIGHT FOR STAGE I

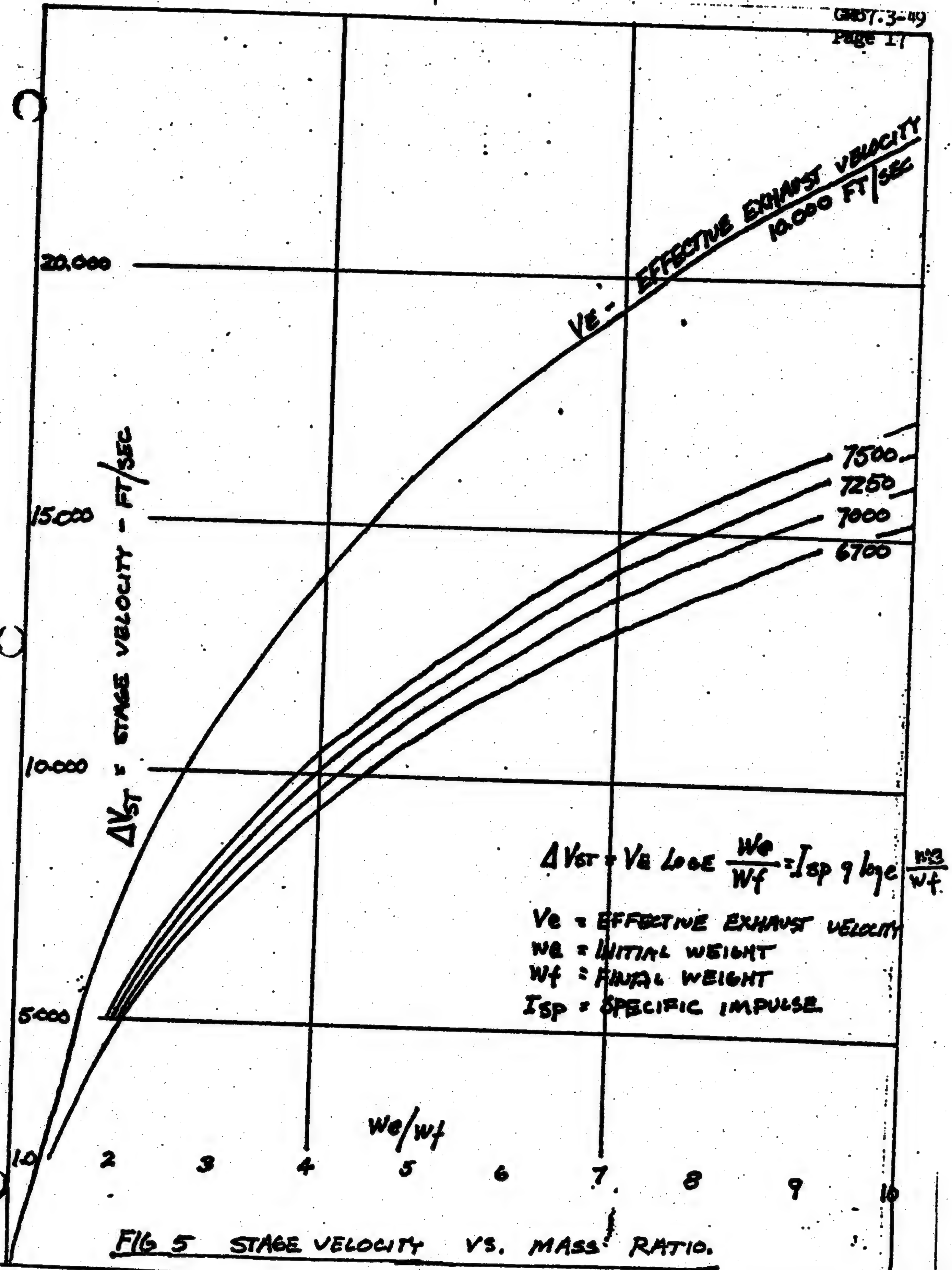


FIG 5 STAGE VELOCITY VS. MASS RATIO.

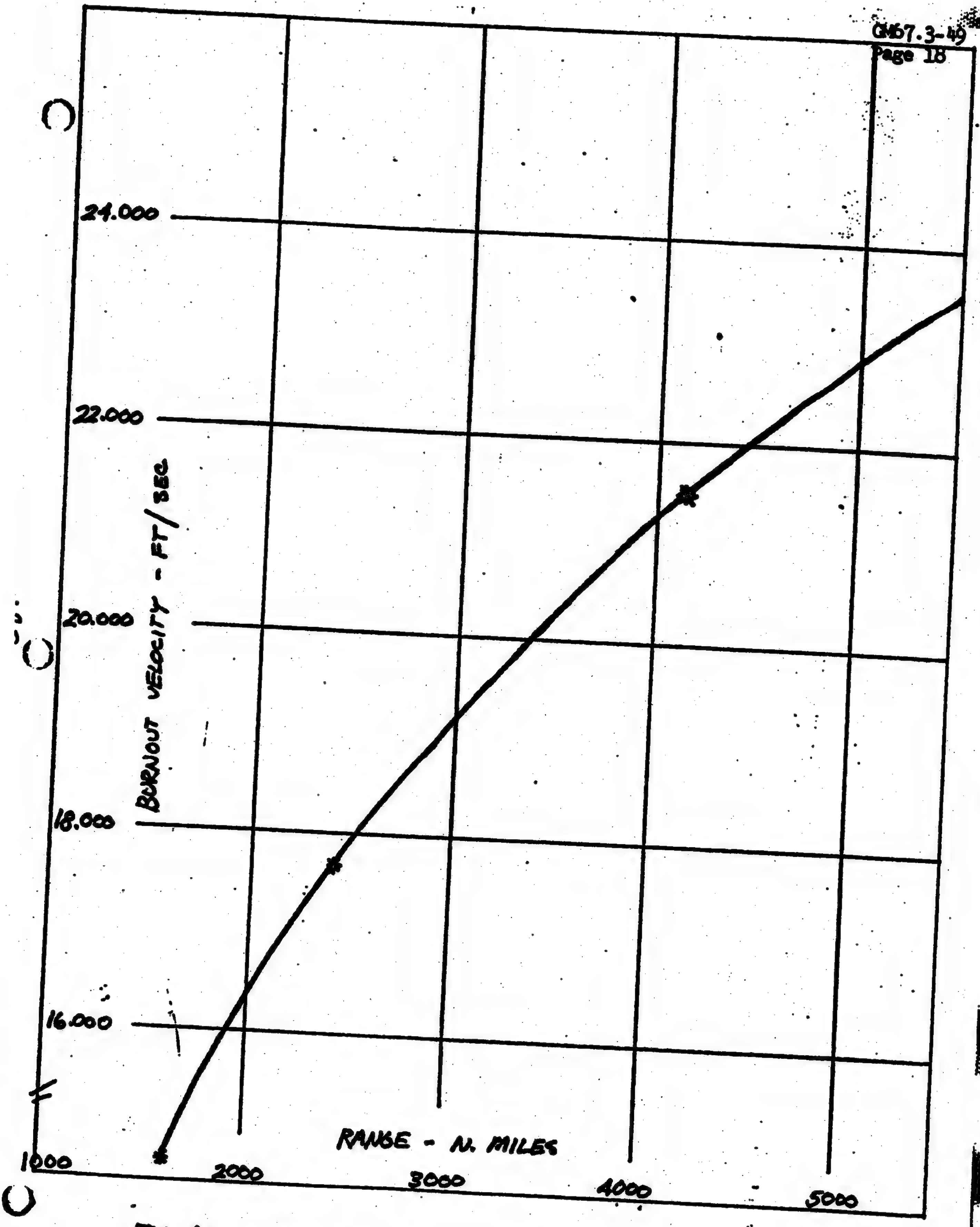


FIG. 6 RANGE VS. BURNOUT VELOCITY

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APPENDIX I

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

15 May 1957

MEMORANDUM FOR CHAIRMAN, SCIENTIFIC ADVISORY BOARD

SUBJECT: SAB Special Study of Advanced Weapon Technology and Environment

1. Reference is made to your memo of February 20, 1957, transmitting the report of the Fuels and Propulsion Panel, which suggested special studies, on a broad basis, of the problems of national defense in cis-lunar space.

2. In accordance with your suggestion, I would like the SAB to establish such a special study group, to review these problems with particular regard to their impact on future weapon technology and the operating environment in which they may function.

3. The present trend of technology in ballistic vehicle development seems to indicate an early capability of rocket type vehicles to reach new regions of cis-lunar space. This suggests the possibilities of military operations in completely new environments. The attendant technological problems of vehicle design, propulsion, weapons effects, communications, human factors, strategy and tactics, and many others, need careful investigation. The severe impact on military operations makes it imperative that the Air Force keep abreast of the latest thinking in these areas and to be immediately informed of potential breakthroughs.

4. Studies are presently underway at the Ramo-Wooldridge Corporation, in conjunction with WDD and Hq USAF. It is suggested that the SAB committee review the work of these groups (which should be available in August) as well as studies at the RAND Corporation and industry groups which are considering these problems.

5. It is requested that this committee advise the Air Force with regard to the status of present technological knowledge in this field, and the recommended direction of future programs, for both supporting research to explore this new environment and the study of future weapon systems.

(signed)

D. L. PUTT
Lt. General, USAF
Deputy Chief of Staff, Development

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DOD DIR 5200.10

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~~CONFIDENTIAL~~

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MEMORANDUM FOR: General B. A. Schriever

21 MAY 1957

SUBJECT: ARS (Eastman Kodak)

1. Reference our conversation of 13 May 1957, attached herewith is a second draft of the letter to Dr. Chapman. This is more specific, and is responsive to your discussions on this subject with Dr. Chapman, than was the first draft.

2. The FY 58 estimate of 35 million for WS 117L is consistent both with General Putt's letter of 6 March 1957 and with General Bradley's remarks at the time of the 15 April 1957 briefing to Generals Irvine and Putt and staffs.

3. The sentence regarding the Eastman Kodak - Lockheed relationship was included in order that Lockheed's role not be compromised.

1 Incl
Draft of ltr.
to Dr. Chapman

Charles H. Terhune
CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

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DRAFT

~~CONFIDENTIAL~~

rewritten by WDG Y sent out.

Dr. Albert K. Chapman, President
Eastman Kodak Company
400 Plymouth Avenue, North
Rochester 4, New York

354

Dear Dr. Chapman,

During my visit to Eastman Kodak on 17 April 1957 we discussed the degree of Air Force support that could be expected for WS 117L during the future. While our exact budget for the fiscal year beginning 1 July 1957 is not yet finalized, I anticipate that the total fiscal year program will be approximately thirty ~~five~~ million dollars. Accordingly, Mr. Tuttle's estimate mentioned during our meeting of an annual rate of seven million dollars for the Eastman Kodak portion of the program by early in 1959 appears to me to be reasonable for planning purposes. I am sure you realize, however, that because of your role as a sub-contractor to the prime weapons contractor, the Lockheed Missile Systems Division, specific resolution of your company's support will be a matter for negotiation between Eastman Kodak and Lockheed.

I appreciated your time and hospitality during my recent visit and plan to return in the near future for a comprehensive review of the technical aspects of the work Eastman Kodak is doing on this project.

Sincerely,

B. A. Schriever
Major General, USAF
Commander

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WDSS

Reel A/154

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

GENERAL ORDERS)
NUMBER 19)

21 May 1957

SBD

SECTION
REVOCATION OF GENERAL ORDERS. I
ANNOUNCEMENT OF REDESIGNATION OF WESTERN DEVELOPMENT DIVISION, HEADQUARTERS ARDC II

I. REVOCATION OF GENERAL ORDERS

1. General Orders Number 15, current series, relating to the redesignation of the Western Development Division, Headquarters ARDC, is revoked.

II. ANNOUNCEMENT OF REDESIGNATION OF WESTERN DEVELOPMENT DIVISION, HEADQUARTERS ARDC

Effective 1 June 1957, the Western Development Division, Headquarters ARDC with location at Inglewood, California, is redesignated the Air Force Ballistic Missile Division, Headquarters ARDC, without change in station.

BY ORDER OF THE COMMANDER:

OFFICIAL:

OFFICIAL

J. W. SESSUMS, JR.
Major General, USAF
Vice Commander

W. J. ATKINS
Colonel, USAF
Adjutant

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RDASO	(2)
RDSOP	(3)
RDBPC	(1)

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WDT

1 June 1957

MEMORANDUM FOR COLONEL ODER, WDTR

SUBJECT: Charter - WS 117L Site Selection Board WDD

386

1. Attached hereto are:

   a. Charter for 117L Site Selection Board.

   b. Request for publication of special orders.

   c. Preparation of preliminary operation of concept for 117L.

2. With regard to items 1a and b above, action will not be taken to publish orders establishing the 117L Site Selection Board at this time. In addition to the above, all actions related to site selection such as review of certain documentation procured for your office by WDI shall be an "in-house" exercise. No contacts will be made with major commands, specific bases, etc. until cleared through this office. I have no objection however, to your use of the proposed charter as terms of reference for the informal "in-house" work performed by your group, and suggest the use of such a document might prove beneficial in the long run when our actions in this area are made public.

3. With respect to your memorandum to the undersigned (reference para 1c above), I seriously doubt that we should suggest to any low ranking group of Hqs USAF personnel that the IOC for 117L should be assigned to the Commander, Ballistic Missiles Division, Hqs ARDC. In the first place, these people are not high ranking or influencial enough to sell such an idea through action of their board. The net result, therefore, will be that they will raise a controversial subject in an uncontrolled manner which will result in more trouble to us in the long run than if we keep it quiet and broach it ourselves at the appropriate time. In other words, let's play down the IOC aspect of the preliminary operational concept and keep our nose to the grindstone on getting the concept out and not jeopardize our chances of getting the IOC by giving it to such a group of low ranking people.

3 Incs
① Subj Charter
② DF reqst for SO
3- Memo (S) WDTR57-162 dtd 23 May 57 filed w/date

CHARLES H. TERHUNE, JR.
COLONEL, USAF
Deputy Commander
Weapon Systems

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WDTR 57-167

~~CONFIDENTIAL~~

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26 JUN 1957

Dr. Albert K. Chapman
President, Eastman Kodak Company
343 State Street
Rochester, New York

Dear Dr. Chapman:

During my visit to Eastman Kodak on 17 April 1957, we discussed the degree of Air Force support that could be expected for WS 117L during the future. While our exact budget for the fiscal year beginning 1 July 1957 is not yet finalized, I anticipate that the total fiscal year program will be approximately thirty million dollars. Accordingly, Mr. Tuttle's estimate mentioned during our meeting of an annual rate of seven million dollars for the Eastman Kodak portion of the program by early in 1959 appears to me to be reasonable for planning purposes. I am sure you realize, however, that because of your role as a subcontractor to the prime weapons contractor, the Lockheed Missile Systems Division, specific resolution of your Company's support will be a matter for negotiation between Eastman Kodak and Lockheed.

I appreciated your time and hospitality during my recent visit and plan to return in the near future for a comprehensive review of the technical aspects of the work Eastman Kodak is doing on this project.

Sincerely,

SIGNED

B. A. SCHRIEVER
Major General, USAF
Commander

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WDTRDG
Col Oder

B. Clesby
2230

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R.P.

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

PERSONNEL ACTIONS MEMORANDUM)
NUMBER 34)

28 June 1957

380

1. VOC, iss 25 Jun 57, Asg COL HARRY L EVANS JR., 4619A, this Div, this sta, Prim Dy as Chief, Rqr & Eqp Ofc, Wpn Sys (8416) FA: 57000, are cfm, ESPWO. WDTN

2. The (3) add AFSC 8446 of COL HARRY L EVANS JR., 4619A, this Div, this sta, is w/d and w/b del.

3. COL HARRY L EVANS JR., 4619A, this Div, this sta, is awd AFSC 8446, desig (3). AUTH: Ltr, HEDUSAF, Subj: Awd of R&D Spec, dtd 5 Jun 53.

4. The (add) AFSC 8411 of COL HARRY L EVANS JR., 4619A, this Div, this sta, is w/d and w/b del.

5. COL HARRY L EVANS JR., 4619A, this Div, this sta, is awd AFSC 8411 desig (add). AUTH: Ltr HEDUSAF, Subj: Awd of R&D Spec, dtd 7 Jun 54.

6. VOC, iss 20Jun57, Asg CAPT DAVID D BRADBURN, 17335A, this Div, this sta, Prim Dy as Proj Off, Fac & Equip Sec, Fac & Test Br, WS-117L, Dir WS-117L Wpn Sys (8446) FA: 57000, are cfm, ESPWO. WDTR

7. VOC, iss 23 Jun 57, Asg CAPT KEITH C KINSEY, 26470A, this Div, this sta, Prim Dy as Proj Off, Msl Dev Div, WS-315A, Wpn Sys (8464) FA: 57000, are cfm, ESPWO. WDTI

8. VOC, iss 24 Jun 57, Asg CAPT ALAN G POUND, 25526A, this Div, this sta, Prim Dy as Asst Proj Admin (Aero Jet) Propln Div, Wpn Sys (8446) FA: 57000, are cfm, ESPWO. WDTLP

BY ORDER OF THE COMMANDER:

JACK E TICE
Captain, USAF
Ch, Mil Pers Division

OFFICIAL

Jack E Tice
JACK E TICE
Captain, USAF
Ch, Mil Pers Div

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a1/58

5 July 1957 117L

MEMORANDUM:

SUBJECT: Revision of the WS-117L Program

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1. The decision of the United States to launch a small scientific satellite in orbit during the IGY has committed this country to a program of investigating space. Unfortunately, some people have looked on this project as a stunt which will be completed at the conclusion of the IGY. The fact is, however, that a tremendous public and scientific interest has been generated in upper air research and the impetus provided by the scientific satellite will not easily be halted, if at all. It is generally recognized by the scientific community that the first satellite is an initial step only which, even if successful, would obtain only a small part of the basic data needed and desired. An analysis of the advantages which the Department of Defense can obtain from Project Vanguard, if successful, is attached as Incl. 1. The limited number of orbit attempts in the Vanguard Program will not provide the total amount of data required and many valuable experiments cannot be performed because of the payload limitation in the vehicle. It is apparent, therefore, that a requirement will exist to extend and amplify the Vanguard Program.

2. The National Academy of Sciences is on record in favor of an extension to the Vanguard Program as evidenced by attempts to obtain authority for launching an additional six satellites. Another investigation concerns using a modified Vanguard vehicle with increased payload. A pertinent point in both of these extensions is that they are proposed under continuing Navy management. It should be realized that the Navy is already inserting in publicity releases that the Navy was selected to manage Project Vanguard "because of demonstrated technical superiority in this area." If the Navy is allowed by default to obtain a continuation of the Vanguard Program, then the Navy has a strong possibility of becoming firmly established as satellite and space "experts" and the role of the Air Force in this area will be seriously jeopardized.

3. In 1955 when the services were asked to make proposals for the scientific satellite program, the Air Force was at a critical period in the ICBM program and the 117-L System was not yet authorized. An additional program of questioned value could not then be allowed to interfere with the ICBM effort. Now however a different situation exists. The ICBM effort is well on the way and the 117-L is an established project. The Air Force should now be in a position to aggressively take steps to insure that any further satellite program is under Air Force management.

4. It is recommended that the Air Force revise the WS-117L test program to provide for a Phase I and II as follows:

Phase I - Test of Vehicle and Orbit Capability

Phase II - Capability Test of the Reconnaissance Package

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Weight and space in the satellite during Phase I should be devoted to scientific experiments. A possible method of handling this is to propose a certain number of test vehicles in which the NAS can place instrumentation of a specified weight and volume. If a program is established along these lines, the Air Force will obtain the following advantages:

a. Maximum assurance that space programs will become the role of the Air Force alone.

b. International objections are not likely if the vehicle is for scientific purposes. Thus testing up to the point of putting in the reconnaissance package could be completed prior to any possible objections.

ASA B. GIBBS
Colonel USAF

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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

In reply refer to:
LMSD/35372

8 July 1957

Subject: AF 04(647)-97
Status of Contract Funds

391

To: Chief
Ballistic Missile Office
Air Materiel Command
Attn: E. S. Silberman
P. O. Box 262
Inglewood, California

Through: Assistant Air Force Plant Representative
Lockheed Aircraft Corporation
Missile Systems Division
Van Nuys, California

8

1. The Weapon System Contractor wishes to advise the Ballistic Missile Office that the current cost commitments on the subject contract indicate that 85% of current funding will be expended by approximately the first week in August and 100% of current funding will be expended by approximately 15 August 1957.

2. This condition is due to an increase in expenditure rate to meet the schedule as set forth in your Request for Proposal Work Statement and further commitments toward completion of our subcontract structure.

3. You are requested to take whatever action is deemed necessary to obtain additional funds for the period from approximately August 15 to the end of November, 1957, to adequately cover this program until such time as a definitive contract is executed. It is estimated that $7,900,000 will be required to fund this program between August 15 and November 30, 1957.

4. The Contracting Officer's prompt cooperation in amending the subject Letter Contract with the above required funds will be greatly appreciated.

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

/s/ J. C. Wingerd

J. C. Wingerd
Military Relations Representative
WS 117L Project

8

JCW:mh

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DISPOSITION FORM

SECURITY CLASSIFICATION (If any)

FILE NO.	SUBJECT WEEKLY DIARY - 12 Jul Thru 18 Jul 57
TO MCPT	FROM MCPTA
DATE 18 Jul 57	COMMENT NO. 1

322

This Diary is submitted pursuant to the revised organizational arrangements effective 1 Jul 57, providing for establishment of the WS 117L Branch.

This issue of the Diary will serve to continue items previously submitted under the MCPTS Diary.

1. LOCKHEED AIRCRAFT CORPORATION - AF 04(647)-97 (UNCL)

a. One result of a recent visit to the Contractor's plant was concern as to possible economies in special test equipment costs. The Contractor had submitted a request for approval to purchase items of test equipment, some of which may already be available to the Contractor through his subcontracts, and other items may not actually be essential to the program. Consequently, a conference has been arranged for 25 July, at which time the Contractor will submit a test equipment plan. It is proposed to review this jointly between the Contractor, BMD, BMO and the ACO. This conference should eliminate any duplications and decide which items can be made available from Subcontractor facilities, and should also result in a considerable saving to the program.

b. The Contractor has requested an additional increment of funds to carry the contract forward through September 1957. At this writing adequate P600 funds are available; however, the nature of the Contractor's work at this stage reflects a requirement for other types of funds. Steps have been taken to expedite the receipt of such fund allocations through Hq AMC.

JAMES S. SEAY
L/Colonel, USAF
Chief, WS-117L Branch

~~CONFIDENTIAL~~ ~~SECRET~~ 21B Cinnige 23 Jul 1957 Space Ref #61

Presentation to the Scientific Advisory Board Ad Hoc Committee To Study Advanced Weapons Technology and Environment. To be presented at the first meeting of the Committee, 29 July 1957, at the Rand Corporation, Santa Monica, California.

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Mr. Chairman, and Gentlemen: It is with pleasure that I have come to talk to you today on the contributions of the Ballistic Missiles Program to the achievement of advanced weapons and space flight. This is because of the importance of the subject which you are considering. It is important not only to the Air Force but to the Nation as a whole. I feel that the appointment of your committee by the Scientific Advisory Board is very timely because of the increasing and considerable developments that have occured in the areas of technology under your consideration. There certainly is ever-increasing national recognition of and interest in the application of this technology to future weapons. I had the pleasure of addressing most, if not all, of you at the Scientific Advisory Board meeting at AFMTC on 21 May 1957. At that time, I discussed several aspects of the future of ballistic missiles including a certain amount of information on advanced weapons systems. It is in this latter area that I would like to concentrate my efforts today.

We at AFBMD have a natural interest in the opportunities that the developments of our program offered to more advanced applications. Even though our primary and preoccupying job is to produce ballistic missiles (to develop an early deterrent and strike capability), we would not be doing our job properly if we did not give some attention to the future application and extension of these developments.

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WDTM 57-242

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It is because of the close affinity of developments of the Ballistic Missile Division to more advanced weapons that we have been given management responsibility for the Advanced Reconnaissance System. This system, Weapon System 117L, will, I understand, be more fully reported on by a representative of Lockheed Aircraft Corporation. Lockheed is participating as a prime weapon system contractor for the Advanced Reconnaissance System. I will, therefore, make my remarks more generally applicable to the particular subject of your committee's concern. Another area, which I do not seek to discuss fully since it will be covered subsequently, will be those study efforts in which we have asked the Ramo-Wooldridge Corporation to engage. For this purpose Ramo-Wooldridge has formed a summer study panel, under Dr. Bacher, to study the requirements for advanced weapon systems versus the capabilities that exist to produce such systems. I believe the fore-going examples are, however, sufficient to indicate to you that we are in fact aware of and are involved in considerations regarding advanced weapons. Back of all of this is, of course, a rather fundamental underlying reason. It is this: Any future ballistic missile, or any system which seeks to go into "non-aerodynamic" space will require relatively large amounts of energy in the form of a propulsive device, along with an attendant requirement for guidance, auxiliary power, launch facilities techniques, etc. If we consider payloads in excess of a few pounds, the only significant existing equipment developments which would serve as a basis for meeting these needs are not contained within the ballistic missiles program.

At this juncture, I would like to make a point which is perhaps obvious but which because of its significance need some emphasis. The attainment of these items of hardware (large airframes, propulsion, guidance etc.) plus the supporting facilities and techniques required for their development and production is extremely costly in terms of both dollars and manpower. It does not appear likely that the Air Force or the Nation as a whole will be able to afford extensively diversified and perhaps competing development programs toward the goals which you are studying. Another way of looking at it is that the Air Force must develop a coherent program in this area of technology in order that, first of all, our military requirements can be met and, secondarily, that the most efficient use be made of the developments available from present and anticipated programs in this broad area.

I would like now to discuss some of the quantitative aspects of our development work. We have given careful study to the ability of the three ballistic missiles (SM 65, SM 68, SM 75) under development by AFBMD to carry loads other than those of the standard warheads for which they have been designed. This (slide 1) shows the results of these analysis insofar as the problem of carrying a satellite vehicle on the ICBM is concerned. You will note that the SM 65 and SM 68 have essentially the same capabilities. This is for the unmodified vehicle less its standard nose cone plus only those fittings necessary to attach the larger payloads to the vehicle. Depending on the actual structural factors obtained with the WS 117L vehicle, it may also be possible to orbit with substantial payloads (50 - 300 lbs.) using an IRBM as a booster. For certain scientific missions this might be the most economical approach.

We have also studied the application of these missiles with some modification.

This (slide 2) shows certain feasible combinations. The first case is the present WS 117L configuration, the second diagram illustrates a modified SM 65 with a cylindrical oxygen tank to permit it to carry a heavier nose cone. The present sustainer engine would be replaced with one of the first stage engines, making three 150,000 lb. thrust engines in all. Two upper stages are visualized, one is the second stage of the SM 68, and the other is a new design using ammonia and fluorine as propellants. Note the very large payloads that can be carried with these configurations.

The previous discussion pertained to liquid fueled propulsion. Important advances during the last year or so have caused AFBMD to take an up-to-date look at the role of solid propellants, particularly as applied to Intermediate Range Ballistic Missiles. As their study was fairly extensive, time permits me only to cover certain of its highlights. Parametric design analysis of the capabilities of ballistic missile systems utilizing solid propellant propulsion systems were studied for the 1960, 1965, and 1970 eras. These analyses included the determination of the performance parameters of missiles capable of delivering warheads weighing from 300 to 10,000 pounds for ranges varying varying between 500 and 2000 miles.

The results presented (slide 3) indicate that ballistic missile systems based on solid propellant rocket engines have significant growth potential over the time period 1960 to 1970.

For all the parameters which form the basis of these analyses, conservative values consistent with sound engineering practice and practical manufacturing considerations were chosen. For example, the propellant characteristic exhaust velocity, C* = 4800 ft/sec, assumed for the 1960 time period, has already been exceeded in test firings of motors providing up to 75,000 pound seconds of impulse. Similarly the development of the solid propellant missiles considered for the 1960 time period does not require any radical improvements in the present state-of-the-art.

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The advantages of such solid propellant missiles as were considered appear to be quite worth while from the points of view of production cost, relative ease of handling, and requirements for operational facilities.

In the field of guidance, as you know, we are presently developing both radio inertial and all inertial guidance systems. Because of its relatively light weight and high accuracy, the General Electric radio guidance equipment of the ATLAS booster could be used to track and guide satellite or lunar vehicles during the initial portions of their flight. To obtain the burnout speed required for satellite or lunar applications, the velocity increment which must be added following separation from the booster will be quite large and both cases certain additional guidance equipment would have to be carried in the second stage vehicle. The accuracies required for placing a vehicle on a lunar impact course are well within the capability of present guidance equipment. Establishing a lunar satellite is also within present guidance capability, but if the orbit is to be closely controlled the problem becomes one of sensing errors in the trajectory as the vehicle approaches the moon and applying corrective increments during the final burning period. The most difficult lunar trajectory from the point of view of guidance requirements is circumnavigation of the moon and subsequent recovery at earth. With present accuracy limitations, this mission can be attempted only by swinging wide around the moon so that uncertainties in the distance of closest approach are not great enough to risk impact.

Now let us turn to the problem of auxiliary power aboard the vehicle in question. Because of the relatively short flight times of the ICBM and IRBM the auxiliary power equipment being developed for these missiles would not in its present form be directly applicable to uses requiring much longer duration power such as those aboard a satellite or lunar vehicles.

During the course of the ballistic missile program we have developed a large array of facilities for testing purposes, both of a static and of a flight test nature. Not only the facilities themselves but the knowledge gained in their development, construction and utilization will be of considerable importance in future programs.

Another area that I would like to touch upon is in the technique of launching of these large vehicles. We have had to face many new problems and solve them satisfactorily before we could test our presently developed vehicles. Most of the experience gained here will be a valuable stepping stone toward future development programs.

Last of all I think it fitting to mention the industrial base that has been established. By the creation of the Air Force Ballistic Missiles program a large array of contractors in a wide variety of fields have, because of their participation, gained extremely valuable experience in the development of components and testing of the many pieces of hardware that go into this type of technology. But sometime in the future as we phase out of the primarily developmental aspects of the ICBM and the IRBM program to those more of an operational nature, a fairly large industrial base will become available on which future programs might well be based.

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AIR FORCE BALLISTIC MISSILE DIVISION

30 July 1957

WDTR

SUBJECT: Program Planning Guidance for WS 117L

THRU:
Commander
Air Research and Development Command
ATTN: RDZGW
P.O. Box 1395
Baltimore, Maryland

TO:
Deputy Chief of Staff, Development
Headquarters, USAF
Washington 25, D. C.

1. Deputy Chief of Staff, Development, letter of 10 December 1956, subject "Requirement for Additional FY 1957 Funds for WS 117L" stipulated that neither a mockup for inspection or a complete experimental test item be constructed "until further advised".

2. ~~Air Force Ballistic Missile Division is currently in the~~ process of definitizing the Lockheed prime contract for WS 117L. This contract is being written for a twenty-two month period beginning July 1, 1957. In order to begin orbital testing in 1960 (DCS/D letter, "Planning and Funding Requirements for WS 117L", dated 6 March 1957), it will be necessary because of the lead times involved, to include in this contract construction of a mockup and ground and non-orbital flight test vehicles. It is requested that authority be granted to initiate timely action on these items compatible with the 1960 orbital flight date.

FOR THE COMMANDER:

SIGNED
CHARLES H. TERHUNE, JR
Colonel, USAF
Deputy Commander
Weapon Systems

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SSIFIED. DOD DIR 5200.10

WDTR 57-244

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~~CONFIDENTIAL~~

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WDTR

MEMORANDUM FOR COLONEL TERHUNE AUG 1 1957

SUBJECT: First Meeting of the SAB Ad Hoc Committee on Advanced Weapons and Environment, 29-31 July 1957

1. There is nothing of a spectacular nature to report on the open sessions of the meeting. Essentially the same information was presented by the various industrial contractors (a number with Germanic accents - Dornberger, Steinhoff, Friedrich, Ehricke) and depending upon whether or not the company had participated in ROBO-BOMI type work they were either pushing for the boost-glide concept or not.

2. Of the various presentations the best in terms of both content and presentation was that of R-W's given by Jack Irving. Rand's also was good as was Lockheed's. Of the rest too many appeared to be either rehashes of old material (Steinhoff representing Aerophysics actually used the old HADC study on the Ballistic Rocket Test Vehicle) or were obviously hasty back-of-the-envelope deals. Two or three were just plain lousy.

3. Ridenour, who with Salter spoke for Lockheed, made quite a pitch for a strong environmental program aboard the WS 117L vehicle. After discussion with Carter about this it appears that Ridenour was trying to put pressure on us to let Lockheed do some of this work. As you know, we have given this job - the environmental job - for WS 117L to AFCRC. AFCRC has at least an order of magnitude more capability and experience than IMSD in this area and I do not see building up IMSD when the Air Force already has the capability at its disposal.

4. A copy of the agenda and list of attendees is attached.

2 Incls
a/s (UNCL)

FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

see SAB Report
dated 9 Oct 57

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ARDC PRESENTATION TO THE SAB AD HOC COMMITTEE
ON
ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT

29 July 1957

0945-1000	ARDC Keynote Speech	Brig. Gen. Marvin C. Demler Dep Cmdr, R&D, Hq ARDC
1000-1025	Selected Systems Studies 5 min Discussion	Col. Augustus Prentiss Dir of Systems Plans Dep Cmdr, Weapon Sys, Hq ARDC
1030-1040	BREAK	
1040-1055	Contributions of the AFBMD Program to Future Weapons 5 min Discussion	Col. Frederick Oder Dir of System 117-L AFBMD
1100-1130	Propulsion, Secondary Power, and Vehicle Design 5 min Discussion	Mr. Ezra Kotcher Tech Dir, Dir of Labs, WADC
1135-1155	Guidance and Control 5 min Discussion	Mr. James Burke Tech Adv, Dir of Air Weapons Dep Cmdr, R&D, Hq ARDC
1200-1300	LUNCH	
1300-1310	Communications 5 min Discussion	Major Edward Wright Chf Comm Div Comm & Elec Dir Dep Cmdr, R&D, Hq ARDC
1315-1335	Human Factors 10 min Discussion	Brig. Gen. Donald Flickinger Dir of Human Factors Dep Cmdr, R&D, Hq ARDC
1345-1415	Geophysics 5 min Discussion	Dr. Murray Zelikoff Chf of Photo-Chem Lab Geophysics Res Dir AFCRC
1420-1445	Research Trends 5 min Discussion	Dr. Morton Alperin Dir of Office for Advanced Studies AFOSR
1450-1515	Summary Discussion of the ARDC Presentation	

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

24 July 1957

SAB SPECIAL STUDY OF ADVANCED WEAPONS TECHNOLOGY & ENVIRONMENT
29-31 JULY 1957
THE RAND CORPORATION, SANTA MONICA, CALIFORNIA

TENTATIVE AGENDA

MONDAY - 29 July 1957 - (Entire day closed to Industry representatives)

0900 - Executive Session (Committee members only)
0925 - Introduction - General Putt, DCS/Development, Hq USAF
0930 - Directorate of Development Planning, DCS/Development, Hq USAF (Lt Col Ryan)

ARDC BRIEFING.

0940 - Keynote Speech - Brig Gen. M.C. Demler, Deputy Commander, R&D
1000 - Systems Studies - Col A. M. Prentiss, Jr.-Director, Systems Plans
1030 - AFBMD Studies - ~~Major Gen B. A. Schriever~~- Commander, BMD
1100 - Vehicle Design, Propulsion & Secondary Power
Mr. Ezra Kotcher, Tech Director for Dev., Directorate of Labs.
1130 - Guidance, Control, Communications - Dr. J. V. Burke, Tech Director, Weapons Division
Major E. N. Wright-Chief, Navigation Aids Branch
1200 - Lunch
1300 - Human Factors - Brig Gen D. Flickinger, Command Surgeon, Director of Human Factors
1330 - Geophysics - Dr. M. Zelikoff, Cambridge Research Center
1400 - Research Trends - Dr M. Alperin, Office for Advanced Studies, OSR
1430 - Discussion Period
1515 - Break
1530 - Ramo-Wooldridge Presentation (~~S. Ramo~~ J. Irving)

TUESDAY - 30 July 1957

0900 - Executive Session
0915 - RAND Presentation (R. Buchheim) (Open to all attendees)
1115 - Break

Each of the following presentations are closed to industry representatives other than the company making the presentation:

1130 - Aeromutronics Systems, Inc. (E. Krause)
1200 - Lunch
1300 - Aerophysics Development Corp. (~~W. Bollay~~ Steinhoff)
1330 - Boeing Aircraft Co. (H. Longfelder)
1400 - Bell Aircraft Co. (W. Dornberger)
1430 - Break
1500 - Convair Astronautics Division (H. Friedrich)
1530 - Douglas Aircraft Company (E. Wheaton)

Tentative Agenda for
SAB Special Study of Adv Wpns Technology & Environment (continued)

TUESDAY - 30 Jul 57 (continued)

1600 - Lockheed Missiles Systems Div. (L. Ridenour))
1630 - Martin Company (G. Trimble)
1700 - North American (R. Wilson)
1730 - Adjourn

WEDNESDAY - 31 July 1957

Executive Session (Committee members only)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, 25, D.C.

ATTENDEES AT SCIENTIFIC ADVISORY BOARD MEETING ON ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT

19 July 1957

SCIENTIFIC ADVISORY BOARD

STEVER, Dr. H. Guyford (Chairman) - M.I.T.
KAPLAN, Prof. Joseph - U.C.L.A.
MILLIKAN, Dr. Clark B. - C.I.T.
MILLS, Dr. Mark M. - U.C.R.L.
RADFORD, Dr. W. H. - M.I.T.-Lincoln Labs
RAMO, Dr. Simon - Ramo-Wooldridge
WHITE, Dr. Clayton S. - The Lovelace Foundation
(Alternate: Dr. Loren Carlson)
HASERT, Mr. Chester N. - SAB Secretariat

HQ USAF

BOUSHEY, Colonel - Deputy Dir of Research and Development
CARLSON, Dr. Harold - Directorate of Intelligence
FENSLER, Mr. Wm. E. - Air Tech. Intelligence Cntr
GEYER, Dr. H. Kenneth - Operations Analysis
GREY, Dr. James - Directorate of R and D
JOSEPH, Mr. Joseph A. - Operations Analysis
~~McDOWELL~~, Col Mw. L. - War Planning
~~NUNZIATO~~, Col Ralph J. - DCS/Development-Special Projects
RYAN, Lt Col J. A., Jr. - Directorate of Development Planning
~~STRANATHAN~~, Maj Gen L. S. - Director of Development Planning
TIPTON, Col James - War Planning

HQ ARDC

BURKE, Mr. James V.
DEMLER, Brig Gen M. C.
FLICKINGER, Brig Gen D.
HETHERINGTON, Dr. Albert
KIESSLING, Col E. H.
MASSEY, Maj Julius H.
NJUS, Lt Col O.
PRENTISS, Col A. M. Jr.
STRATHY, Lt Col C. G.
VANN, Lt Col J. O.
~~WILLIAMS,~~ Col Wm. A.
WRIGHT, Major E. N.
ODER, Col - AFBMD
~~RITLAND, Brig~~ Gen - AFBMD
~~SCHRIEVER,~~ Maj Gen - Commander, AFBMD

ARDC CENTERS

ALPERIN, Dr. Morton-Dir Adv Studies, AFOSR
~~BRYAN, Maj Gen~~-Commander, WADC
CAMPBELL, Col - AFOSR
DAVIS, Maj Gen L.-Commander, HADC
FOUSE, George - WADC
GASSER, Col - WADC
GIBSON, Col - HADC
~~GREENBERG, Mr.~~ - AFCRC
KAPLAN, Carl - AFOSR
KOTCHER, Ezra - WADC
~~MONAHAN, Mr.~~ - AFCRC
WORTH, Weldon - WADC
ZELIKOFF, Dr. M. - AFCRC
GREGORY, Brig Gen H. F. - Commander, AFOSR

Attendees at SAB mtg on Adv Weapons Technology and Environment (continued)

AIR UNIVERSITY

ERWIN, Col W. H. Bruce

NACA

EGGERS, Dr. Alfred

INDUSTRY

AERONUTRONICS

KRAUSE, Mr.
DURAND, Dr. Eric
HAVENS, Dr. Ralph
JOHNSON, Montgomery
KARSCH, Herbert (Proj Officer)
MAYER, Horace

AEROPHYSICS

BOLLAY, Dr. William
STEINHOFF, Dr.

BELL ACFT

DORNBERGER, Dr. Walter R.
FORREST, Mr. Clarence L.
ISENBERG, Dr. Joel
STRUNK, Mr. DeForest A.
DECREVEL, Mr. Roland
DUKES, Mr. Wilfred

BOEING

LONGFELDER, Mr. Harlowe Julius
BLUMENTHAL, Mr. Leroy Vaughn
MURRAY, Mr. Donald

RAMO-WOOLDRIDGE

IRVING, Dr. John

CONVAIR

EHRICKE, Krafft Arnold
FRIEDRICH, Mr. Hans Rudolf
STEELE, Mr. Harry Bruce

DOUGLAS ACFT

WHEATON, Mr. E. P.
HUNTER, Mr. M. W.

LOCKHEED

RIDENOUR, Dr. Louis N.
SALTER, Robert
~~CARTER, John~~

MARTIN

TRIMBLE, Mr. George
DENIKE, Mr. John
PITKIN, Mr. Marvin

NORTH AMERICAN

WILSON, Mr. R. C.
MYERS, Mr. Dale D.

RAND CORPORATION

BUCHHEIM, R. W.
CLEMENT, G. H.
GABLER, R. T.
GAZLEY, Carl, Jr.
HEFFERN, E. C.
KELLOGG, W. W.
KRIEGER, F. J.
LANG, H. A.
LIESKE, H. A.
WILSON, A. G.

Alternates

AUGENSTEIN, B. W.
DOLE, S. H.
PEASLEE, Lt Col J. C.
PINKEL, B.
SMITH, F. T.
VESTINE, E. H.

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~~CONFIDENTIAL~~

8 August 1957

MEMORANDUM:

SUBJECT: ANTI-SATELLITE MISSILE SYSTEM

1. The whole world now knows that the United States is planning to launch a small scientific satellite during the IGY. Considerable publicity has also been given to statements that Russia intends to launch a satellite during the IGY. Significant is the fact that Russia has offered no objections to the passage of a satellite over communist territory. It is equally significant that the United States has offered no objection to the passage of a satellite over American territory.

2. The Air Force now has a weapon system program, WS-117L, which has as its object the placing of a military satellite in orbit capable of obtaining order of battle information from any point on the globe. It must be assumed that if the United States can develop such a weapon system, Russia can also. I do not know the policy of the United States concerning reconnaissance of the entire country by a foreign satellite, but I assume that this subject must have been considered in the "Open Sky" proposal and in the disarmament proposals now being discussed. Whether the policy is for or against, it seems to me that this country must have the capability in being to knock a foreign satellite out of the sky. Whether this capability will ever be exercised is similar to the atom bomb question.

3. State of the art information indicates that we can develop a satellite capable of producing usable reconnaissance information within five years. It seems reasonable to assume that Russia can also develop a reconnaissance satellite within five years. If we wish to develop a weapon system capable of intercepting and destroying a foreign satellite during this time period, we had better get busy.

Asa B. Gibbs
ASA B. GIBBS
Colonel, USAF

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C O P Y

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13 August 1957

SUBJECT: Contract AF 04(647)-97, Status of Contract Funds

TO:
Lockheed Aircraft Corporation
Missile Systems Division
ATTN: Mr. J. C. Wingerd
Post Office Box 504
Sunnyvale, California

1. Reference is made to your letter LMSD/35372, dated 8 July 1957, concerning the status of funds.

2. The Air Force fund program for Fiscal Year 1958, applicable to WS 117L, has not been established as of this date.

3. Pending a determination of program funding, a limited amount will be made available to the contract. The amount being processed is $3,900,000, which is the maximum additional sum available to carry your program through 30 October 1957.

4. It is therefore requested that you adjust your planning, as indicated above.

/s/ Eugene S. Silberman

EUGENE S. SILBERMAN
Contracting Officer

copy furnished:
Administrative Contracting Office
WDTR

MCPTS E.H.
Mr. Silberman

~~SECRET~~

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WDCMM
ATTN: Capt. F. L. Wilson

WS 117L R&D Manpower Program Summary

WDTR

Maj. Solomon/ls/2132

1. Request necessary action be taken to submit to WDCMM, Hq ARDC, a Hq ARDC Form 0324 (Review of Direct Manpower Requirements) correcting the D-83 [illegible]

2. The manpower summary inclosed reflects the up-to-date coordinated requirements for manpower to be charged against WS 117L.

3. Request the WS 117L Project Office be provided with an information copy of the action taken by your office.

408

2 Incl.
1. R&D Manpower Program Summary, 5pp and 1 c. [illegible]
2. DF fr WDCMM (S) "System Devel. Plan No. 117L" 2 pp with incl. [illegible]
WD 5702116

FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

When inclosures are withdrawn the classification of this correspondence will be downgraded to Unclass in accordance with AFR 205-1.

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DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

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FORCE BALLISTIC MISSILE DIVIS.
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 262
Inglewood, California

IN REPLY ADDRESS COMMUNICATION TO COMDR, WDD, ATTENTION FOLLOWING OFFICE SYMBOL

WDTL

14 August 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Limitation on P-600 Expenditures

1. On Friday afternoon, 9 August 1957, this office received word from the Comptroller of a meeting in Baltimore on 12 August on the above subject. Our assistance was requested and Major Carter attended the meeting.

2. The meeting was called because of verbal instructions received by Baltimore from Mr. Garlock's office in the Pentagon. Baltimore has been given instructions to come up with a plan for very strict control of expenditure of the P-600 monies for FY 58 and all preceding years. Similar instructions have gone via TWX to AMC on other series monies. It is understood that this control on expenditures is necessary to assure that the Treasury does not exceed the national debt ceiling.

3. ARDC has been given an expenditure-ceiling for FY 58 of 633.0 million dollars. During the first six months, expenditures must be held to 316.5 million dollars. As noted previously, this includes all year monies. Hq ARDC has investigated expenditures to date and it appears that approximately 20 million dollars must be cut from the expenditures of the first six months in order to live within the ceiling established.

4. Although the wires from Hq USAF to AMC on the P-100 and P-200 money specifically exempted the ballistic missile program, planning at Hq ARDC was that AFBMD would have to stand its proportionate share of the cut in P-600 money. This matter and the matter of center support of our program was discussed with Colonel Hoerman and Lt Colonel Arnold of Hq ARDC by Major Carter and Major Palmos of AFBMD. As a result, it was agreed that the ballistic missiles program would be exempt in the P-600 area also and that the Centers would be instructed that their support activities in support of our program would be exempt from any cut.

5. As a result of Monday's meeting, Hq ARDC will send a wire to each of the Centers with an expenditure ceiling for the first six months of FY 58. This ceiling will be established considering the priority of the programs being conducted at the Center, the relationship between the Centers (Test Support) and will be calculated to reduce services to

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other agencies of the government which are now furnished by ARDC. We will receive a copy of this wire and the ceiling for AFBMD will be the figure we require for the program. Major Palmos gave figures of 24.3 million for the ballistic missiles program, 5.635 million for WS-117L and .365 million for Cooke AFB and miscellaneous. A statement will be made in the wires to the Centers which requires the Centers not to cut any support activity in support of our program. On Friday, 16 August, the Centers are to return to Hq ARDC with a plan as to how they will live within this ceiling. Certain adjustments will undoubtedly be made at this meeting to arrive at a firm ceiling figure for each Center.

6. Although the ballistic missiles program is exempt from the imposition of a special ceiling, it is understood that WS-117L is not exempt. Therefore, it is possible that WS-117L will receive a cut in their P-600 monies.

7. It appears that no further action is required at the moment. However, we will probably have to scrutinize the final Center support budget quite closely in order to assure that items we do not need have not been moved into the "Support of AFBMD" category.

cc: Maj Palmos

Lawrence D Ely
LAWRENCE D. ELY
Colonel, USAF
Director, Technical Divisions

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MCP, Hq AMC, 11 Jul 57, Subj: Establishment of ARDC-AMC Weapon System Project Office for the Advanced Reconnaissance System

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Air Force Ballistic Missile Division, P.O. Box 262, Inglewood, California 16 AUG 1957

TO: Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio

1. Reference paragraph 1, basic letter, the DCS/D directive referred to used the term "conventional" preceding "Weapons System Project Office" from which it is inferred that the AMC-ARDC relationship regarding WS 117L will administratively be more similar to those Weapon System Project Offices at Wright-Patterson Air Force Base insofar as programming and other functions are concerned. These functions can, no doubt, be undertaken by the Ballistic Missiles Office.

2. Reference paragraph 2, basic letter, action has already been taken by General Funk to provide personnel to the WS 117L Project Office.

FOR THE COMMANDER

cc: General Funk

(S)
J. L. HAMILTON
Colonel, USAF
Executive Officer

WDER dh
Col. Oder 1171-72

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AIR MATERIEL COMMAND
BALLISTIC MISSILES OFFICE
P.O. Box 262
Inglewood, Calif.

#18

MCPTA

21 August 1957

SUBJECT: P-600 Expenditure Ceilings FY 58

THRU: Assistant AF Plant Representative
Lockheed Aircraft Corporation
Missile Systems Division
Sunnyvale, California

TO: Lockheed Aircraft Corporation
Missile Systems Division
Attn: Mr. Joe Wingerd
P.O. Box 504
Sunnyvale, California

1. As a result of expenditure ceilings imposed during FY 58 on the Advanced Reconnaissance (117L) System, Lockheed Missiles Division is hereby requested to reduce invoice billings for payment in order that Air Force expenditures on Contract AF04(647)-97 will not exceed 9.6 million dollars of P-600 type funds during fiscal year 1958. Furthermore, no more than fifty percent of this ceiling is to be expended during the first six months of the fiscal year.

2. Lockheed Missile Systems Division is advised that cumulative expenditures to date for FY 58 approximate 1.0 million dollars. It is also to be recognized that a definitization of letter contract AF04 (647)-97 is anticipated during the first half of FY58, which will further result in payment of accrued fee and costs. These factors should be taken into consideration in developing expenditure rates which will comply with imposed ceilings.

3. The contractor is requested to advise the Weapon System Project Office as to the effect of these expenditure ceilings in the program as set forth in Work Statement WDTR 57-131.

/s/ Eugene S. Silberman

EUGENE S. SILBERMAN
Contracting Officer

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28 Aug

419

PRIORITY

X AF

COMDR, AFBMD

CHIEF OF STAFF
HQ USAF
WASHINGTON 25, D. C.

SECRET FROM WDTR 8-13-E FOR AFDDC-SP COLONEL NUNZIATO REFERENCE TELEPHONE CONVERSATION BETWEEN GENERAL RITLAND CMA AFBMD CMA AND COLONEL NUNZIATO CMA AFDDC-SP CMA ON 27 AUG 57 PD FOLLOWING ARE FUND ESTIMATES FOR SYSTEM 117L FOR FISCAL YEARS 1962-1965 PD LIMITED OPERATIONAL CAPABILITY CMA BASED ON RATE OF SIX LAUNCHINGS IN FY 1962 CMA AND TWELVE PER YEAR IN FY 1963 CMA 1964 AND 1965 CLN FIFTY FOUR MILLIONS PER YEAR PD THE ABOVE ARE COSTS OF A LIMITED OPERATIONAL PROGRAM TO ATTAIN BY 1965 THE CAPABILITY TO OBTAIN COMPLETE SMALL SCALE COVERAGE PERIODICALLY AND DETAILED LARGE SCALE COVERAGE OF SELECTED TARGET AREAS ON A DAILY BASIS PD

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CAPTAIN BRADBURN
1171-72

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O. J. RITLAND
Brig. Gen., USAF
Vice Commander

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WDTR 57-327

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~~CONFIDENTIAL~~

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

3 Sep 57

SUBJECT: (Uncl) Program Planning Guidance for WS 117L

TO: Commander
Air Research and Development Command
Post Office Box 1395
Baltimore 3, Maryland

1. Reference is made to your 1st Indorsement dated 13 August 1957 to letter from Ballistic Missile Division dated 30 July 1957, subject: Program Planning Guidance for WS 117L, and to letter this headquarters, subject: Requirement for Additional FY 1957 Funds for WS 117L dated 10 December 1956.

2. Your request that authority be granted to construct a mock-up and ground and non-orbital flight test vehicles for WS 117L is approved to the extent dictated by sound engineering requirements within minimum essential funds expenditures.

3. In letter from this headquarters dated 6 March 1957, subject: Planning and Funding Requirements for WS 117L, you were advised that the estimates under consideration for FY 1958 were as follows:

P-100	15.0
P-200	10.0
P-600	10.0

To date only the $10,000,000 of P-600 funds has been approved. Efforts will continue to obtain the desired P-100 and P-200 funds for WS 117L within this fiscal year.

4. All activity on WS 117L must be limited to the ten million of FY 58 P-600 funds presently available.

/s/ D. L. Putt
D. L. PUTT
Lieutenant General, USAF
Deputy Chief of Staff,
Development

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SEP 19 1957

WDTR

SUBJECT: WS 117L Funding FY 58 and FY 59

TO: Director of Research and Development
ATTN: AFDRD-SS - Major Francis Dillon
Hq. USAF
Washington 25, D. C.

1. Reference TWX AFDRD-SS 42256.

2. The fund requirements and justification for the FY 58 desired budget are contained in WS 117L - MR#4 dated 7 March 1957, a copy of which is in your possession. The only change from MR #4 is the deletion of FY 58 P-300 requirements.

3. Summary forms for FY 58 Austere Budget, FY 59 Austere Budget and FY 59 Desired Budget by Subsystem and Budget Program are inclosed. Also inclosed is a copy of Summary Justification for the FY 58 and FY 59 austere budget submitted to MCPS, 12 September 1957, for AMC use in replying to a request from DCS/M.

4. Justification for the FY 59 desired budget by subsystem is essentially the same as for the FY 59 austere budget with the main differences as follows:

a. The major difference in totals required in the P-100 and P-200 area are occasioned by the difference in the number of SM-65 missiles and supporting equipment to be procured under the two budgets. The impact of the austere budgets for FY 58 and FY 59 is a substantial delay in the initiation of the flight test program. The ground test program in subsystem areas will be increased somewhat to achieve a greater reliability of system components during the stretch out time interval leading to flight test.

b. It is to be noted that there is a difference in P-600 requirements for the two FY 59 budgets. This is occasioned by

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reduction of effort to be placed on the research and development of an advanced version of WS 117L in the austere program.

5. It is strongly recommended that funding at the rate of the desired budget be furnished for the balance of FY 58. It is estimated that a pro rata amount of the desired FY 58 budget or approximately forty-eight million dollars, would allow initiation of the flight test program by the middle of calendar year 1959.

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

4 Incls:
1. FY 58 Fin Plan Summary-1 pg (S) WDTR 57-337
2. FY 59 Fin Plan Summary-1 pg (S) WDTR 57-337
3. FY 59 Fin Plan Summary Desired Budget-1 pg (S) WDTR 57-337
4. Cy TWX-MCPTA-9-1-E (S) 7 pgs-WD 57-03980

WDTR
Maj. Zelenka iz

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FY 58 FINANCIAL PLAN SUMMARY AUSTERE BUDGET

	P-100	P-200	P-600	Total
SM 65 Boosters (0)	0	0	0	0
Airframe P-1755	4.000	1.000	1.700	6.700
Propulsion	4.500	1.000	------	5.500
Auxiliary Power P-1757	.600	.500	.500	1.600
Guidance & Control P-1758	2.250	.400	1.500	4.150
Subsystem E P-1759	.800	.400	2.000	3.200
Subsystem F P-1760	------	.200	.150	.350
Subsystem G P-1761	------	.200	.100	.300
Ground Space Comm P-1762	2.000	5.300	2.800	10.100
Data Processing P-1763	------	1.000	.500	1.500
Geophysics P-1764	.850	------	.700	1.550
GPEI P-8728	------	------	.050	.050
TOTALS	15.000	10.000	10.000	35.000

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FY 59 FINANCIAL PLAN SUMMARY AUSTERE BUDGET

	P-100	P-200	P-600	Totals
SM 65 Boosters (3)	4.810	1.470	0	6.280
Airframe P-1755	7.200	2.000	2.500	11.700
Propulsion P-1756	5.220	1.300	1.000	7.520
Auxiliary Power P-1757	1.150	1.300	1.500	3.950
Guidance & Control P-1758	2.500	.500	3.000	6.000
Subsystem E P-1759	1.500	.500	4.000	6.000
Subsystem F P-1760	.350	.500	1.400	2.250
Subsystem G P-1761	———	.500	1.000	1.500
Ground Space Comm P-1762 *	3.000	5.630	4.300	12.930
Data Processing P-1763	———	4.500	3.000	7.500
Geophysics P-1764	.470	.050	.900	1.420
QPRI P-8728	———	———	.150	.150
TOTALS	26.200	18.250	22.750	67.200

* It is to be noted that the above does not include FY 59 P-300 requirements.

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FY 59 FINANCIAL PLAN SUMMARY DESIRED BUDGET

	P-100	P-200	P-600	Totals
SM 65 Boosters (12)	23.230	5.880	0	29.110
Airframe P-1755	7.000	2.190	2.780	11.970
Propulsion P-1756	5.000	1.450	1.700	8.150
Auxiliary Power P-1757	1.150	1.400	2.050	4.600
Guidance & Control P-1758	2.500	0.650	3.870	7.020
Subsystem E P-1759	1.500	0.600	5.000	7.100
Subsystem F P-1760	.350	0.600	4.500	5.450
Subsystem G P-1761	———	0.550	3.000	3.550
Ground Space Comm. P-1762	3.000	6.750	5.000	14.750
Data Processing P-1763	———	5.730	6.000	11.730
Geophysics P-1764	.470	.050	1.410	1.930
QPRI P-8728	———	———	.150	.150
TOTALS	44.200	25.850	35.460	105.510

* It is to be noted that the above does not include FY 59 P-300 requirements.

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PRIORITY X AF

AFBMD-ARDC/AMC BALLISTIC MISSILES OFFICE
INGLEWOOD, CALIFORNIA

COMDR, AMC
WRIGHT-PATTERSON AFB, OHIO

~~SECRET~~ FROM MCPTA 9-1-E FOR MR FRED YOCKE, MCPZ FOLLOWING INFORMATION SUBMITTED INRESPONSE TO TELEPHONE REQUEST FROM MR FRED YOCKE PAREN MCPZ PAREN TO CAPTAIN LEONARD STASZAK PAREN MCPTR PD PARA REVIEW OF WM 57-3 DATED 8 AUGUST 57 DOES NOT REVEAL A CONTINUATION OF THE SCHEDULE BEYOND THREE STARTS UNDER FY 57 FUNDING PD RECOMMEND THE FOLLOWING CHANGES & ADDITIONS TO THE USAF GUIDED MISSILE PRODUCTION SCHEDULE PD READING LEFT TO RIGHT COMMA FIRST LINE CMM ARS CMM LOCKHEED CMM PALO ALTO COMMA BELL XLR-81 CMM ENTER UNDER CY 1958 JUNE CMM ONE CMM TOTAL SIX MONTHS CMM ONE CMM AUGUST CMM ONE CMM SEPTEMBER CMM ONE CMM TOTAL SIX MONTHS CMM TWO CMM UNDER CY 1959 CMM JULY CMM ONE CMM OCTOBER CMM ONE CMM DECEMBER CMM ONE CMM TOTAL SIX MONTHS CMM THREE CMM UNDER CY 1960 CMM FEBRUARY CMM ONE CMM APRIL CMM ONE CMM JUNE CMM ONE CMM TOTAL SIX MONTHS CMM THREE CMM TOTAL INCLUDING ACCEPTANCES CMM NINE CMM FUNDING FY 57 CMM THREE CMM FY 58 ZERO CMM FY 59 CMM SIX CMM FY 60 FIVE PD NEW ENTRY UNDER

.12 Sep 57

MCPTZ

JAMES S. SEAY, LT COL, USAF
Chief, WS 117L Branch
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

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ADVANCED RECONNAISSANCE SATELLITE SECOND LINE CMM READING LEFT TO RIGHT CMM XSM 65 CMM CONVAIR CMM MONTGOMERY FIELD CMM NAA SLASH LEE CMM UNDER APRIL CY 60 ENTER ONE CMM FUNDING FY 59 THREE CMM FY 60 CMM FIVE PD PARA THE FOLLOWING FUND REQUIREMENTS FOR FY 58 AND FY 59 ARE SUBMITTED FOR A PROGRAM BASED ON AUSTERE FUNDING AND DO NOT REFLECT REQUIREMENTS NECESSARY TO MEET GOR REQUIREMENTS PD PARA FY 58 FINANCIAL PLAN SUMMARY AUSTERE BUDGET PAREN A PAREN UNDER THE AUSTERE BUDGET FOR FY 58 CMM NO PROCUREMENTS CAN BE INITIATED ON SM 65 BOOSTERS PD PAREN BPAREN AIRFRAME SUBSYSTEM CMM P-1755 PD FOUR MILLION DOLLARS P-100 FUNDS WILL BE EXPENDED ON CONTINUED FABRICATION OF THREE SATELLITE NOSE CONES CMM THREE TO BE USED IN THE GROUND TEST PROGRAM PD PAREN INCLUDES TOOLING AND IN PLANT HANDLING EQUIPMENT PAREN ONE MILLION DOLLARS P-200 FUNDS WILL BE EXPENDED ON GROUND EQUIPMENT FOR HANDLING AND CHECKOUT OF THE ASSEMBLED VEHICLE AND ITS EQUIPMENT PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR PD PAREN C PAREN PROPULSION SUBSYSTEM CMM P-1756 PD FOUR MILLION FIVE HUNDRED THOUSAND DOLLARS P-100 FUNDS WILL BE EXPENDED FOR BELL AIRCRAFT XLR-81 HUSTLER ENGINES AND ASSOCIATED GROUND TEST PROGRAM PD ONE MILLION DOLLARS P-200 FUNDS ARE REQUIRED FOR GROUND EQUIPMENT FOR CALIBRATION CMM CHECKOUT AND ALIGNMENT OF THE PROPULSION SYSTEM PD LOCKHEED AIRCRAFT CORPORATION CONTRACT DASH BELL AIRCRAFT SUBCONTRACTOR PD PAREN D PAREN AUXILIARY POWER SUBSYSTEM CMM P-1757 PD SIX HUNDRED THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR BATTERY ENERGIZED TEST VEHICLE POWER UNITS FOR GROUND TEST PD FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED

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FOR OPTICAL AND ELECTRONIC DEVICES FOR SOLAR ENERGY EQUIPMENT CMM TURBINES AND ALTERNATORS PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR PD PAREN E PAREN GUIDANCE AND CONTROL SUBSYSTEM CMM P-1758 PD TWO MILLION TWO HUNDRED FIFTY THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR INITIAL PROCUREMENT ASCENT GUIDANCE UNITS CMM TRANSITION COMPUTERS CMM ORBITAL BOOST GUIDANCE UNITS AND AUTOPILOT EQUIPMENT PD FOUR HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR GROUND EQUIPMENT FOR CALIBRATION CMM ALIGNMENT CMM AND CHECKOUT OF GUIDANCE SYSTEM CMM AND EQUIPMENT FOR MONITORING OPERATION OF GUIDANCE UNIT PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR PD PAREN F PAREN VISUAL SUBSYSTEM CMM P-1759 PD EIGHT HUNDRED THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR TEST MODELS FOR LABORATORY CMM ENVIRONMENTAL AND COMPATIBILITY TESTS PD FOUR HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR SPECIALIZED GROUND PHOTO PROCESSING EQUIPMENT AND TEST EQUIPMENTS PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR CMM EASTMAN KODAK SUBCONTRACTOR PD PAREN G PAREN FERRET SUBSYSTEM CMM P-1760 PD ZERO DOLLARS P-100 FUNDS PD TWO HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR GROUND ELECTRONIC EQUIPMENT REQUIRED FOR TESTS OF LABORATORY MODELS PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR CMM AIRBORNE INSTRUMENTS LABORATORIES SUBCONTRACTOR PD PAREN H PAREN INFRARED RECONNAISSANCE SUBSYSTEM CMM P-1761 PC TWO HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR INFRARED DETECTOR LINE ELEMENTS AND MOSAICS CMM OPTICAL CORRECTION DEVICES AND FILTERS CMM CLOSED LOOP COOLING SYSTEMS AND ELECTRONIC COMPONENTS PD LOCKHEED AIRCRAFT

CORPORATION CONTRACTOR PD PAREN I PAREN GROUND SPACE COMMUNICATIONS SUBSYSTEM CMM P-1762 PD TWO MILLION DOLLARS P-100 FUNDS REQUIRED FOR AIRBORNE COMMUNICATIONS EQUIPMENT CMM I.E. CMM DATA TRANSMITTER CMM COMMAND RECEIVER CMM PROGRAMMING TIME GENERATOR CMM ATTITUDE REFERENCE ENCODER CMM AND ANTENNAS PD FIVE MILLION THREE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR PROCUREMENT OF TRACKING CMM ACQUISITION CMM COMMAND CONTROL CMM TEST AND ELECTRONIC CHECKOUT EQUIPMENT FOR THREE TRACKING CMM DETECTION AND ACQUISITION STATIONS PD LOCKHEED AIRCRAFT CORPORATION CMM CONTRACTOR CMM PHILCO CORPORATION SUBCONTRACTOR PD PAREN J PAREN DATA PROCESSING AND INTELLIGENCE DISSEMINATION SUBSYSTEM CMM P-1763 PD ONE MILLION DOLLARS REQUIRED FOR INITIAL PROCUREMENTS OF VIDEO SIGNAL RECEIVERS CMM AMPEX RECORDERS CMM GEOGRAPHIC REFERENCE EQUIPMENT CMM MINICARD EQUIPMENT CMM PROJECTION CMM IDENTIFICATION CMM AND CORRELATION EQUIPMENT CMM DECODERS CMM TIME SPACE INDEX EQUIPMENT CMM TRACK PLOT PRESENTATION EQUIPMENT PD NO PRINCIPAL CONTRACTOR SELECTED PD PAREN K PAREN GEOPHYSICS SUPPORTING PROJECT CMM P-1764 PD EIGHT HUNDRED FIFTY THOUSAND DOLLARS REQUIRED FOR THE PROCUREMENT OF AEROBEE HIGH ROCKETS TO CONDUCT THE TEST PROBE PROGRAM IN THE GATHERING OF DATA CONCERNING METEOR IMPACT CMM SOLAR RADIATION CMM ATMOSPHERIC DENSITY CMM AND THERMAL RADIATION PD NO PRINCIPAL CONTRACTOR PD PAREN L PAREN SUMMARY COST TOTALS FY 58 FIFTEEN MILLION DOLLARS P-100 FUNDS CMM TEN MILLION DOLLARS P-200 FUNDS PD PARA FY 59 FINANCIAL PLAN SUMMARY AUSTERE BUDGET PD PAREN A PAREN FOUR MILLION EIGHT HUNDRED TEN

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THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR PROCUREMENT OF THREE SM 65 BOOSTERS PD ONE MILLION FOUR HUNDRED SEVENTY THOUSAND DOLLARS REQUIRED FOR PROCUREMENT OF GROUND SUPPORT EQUIPMENT FOR SM 65 BOOSTERS PD CONVAIR AIRCRAFT CONTRACTOR PD PAREN B PAREN AIRFRAME SUBSYSTEM CMM P-1755 PD SEVEN MILLION TWO HUNDRED THOUSAND DOLLARS REQUIRED FOR PROCUREMENT OF SIX SATELLITE NOSE CONES AND CONTINUED GROUND TESTING PROGRAM CMM AND EXPENDITURES INCIDENT TO PREPARATION FOR INITIATION OF FLIGHT TEST PROGRAM PD TWO MILLION DOLLARS P-200 FUNDS REQUIRED FOR CONTINUED PROCUREMENTS OF GROUND SUPPORT EQUIPMENT PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR PD PAREN C PAREN PROPULSION SUBSYSTEM CMM P-1756 PD FIVE MILLION TWO HUNDRED TWENTY THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR PROCUREMENT OF XLR-81 ~~ENGINES AND CONTINUED GROUND TEST PROGRAM AND EXPENDITURES INCIDENT~~ TO INITIATION OF FLIGHT TEST PROGRAM PD ONE MILLION THREE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR CONTINUED PROCUREMENT OF GROUND SUPPORT EQUIPMENT INCLUDING DECAY COMPARATORS CMM ELECTRO MECHANICAL PROGRAMMERS CMM OVER RIDE CONTROLS CMM JET POSITION MONITORS, ETC. PD LOCKHEED AIRCRAFT CORPORATION CONTRACTOR CMM BELL ACFT SUBCONTRACTOR PD PAREN D PAREN AUXILIARY POWER SUBSYSTEM CMM P-1757 PD ONE MILLION ONE HUNDRED FIFTY THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR THE INVERTERS ETC. PROCUREMENT OF BATTERY POWER SUPPLIES CMM REGULATORS CMM ONE MILLION THREE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR GROUND SUPPORT EQUIPMENT FOR CONTINUATION OF SYSTEM INTEGRATION GROUND TESTS AND PREPARATION FOR INITIATION OF FLIGHT TEST PROGRAM PD

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LOCKHEED AIRCRAFT CORPORATION CONTRACTOR PD PAREN E PAREN GUIDANCE AND CONTROL SUBSYSTEM CMM P-1758 PD TWO MILLION FIVE HUNDRED THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR CONTINUED PROCUREMENT OF GUIDANCE EQUIPMENTS IN CONTINUED SUPPORT OF GROUND TEST PROGRAM AND FOR INITIATION OF FLIGHT TEST PROGRAM PD FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR GROUND SUPPORT EQUIPMENT IN SUPPORT OF GROUND TEST PROGRAM AND INITIATION OF FLIGHT TEST PROGRAM PD PAREN F PAREN VISUAL SUBSYSTEM CMM P-1759 PD ONE MILLION FIVE HUNDRED THOUSAND DOLLARS P-100 FUNDS REQUIRED FOR PROCUREMENT OF EQUIPMENT FOR BALLOON TEST PROGRAM AND AIRCRAFT TEST PROGRAM PD FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS REQUIRED FOR CONTINUED PROCUREMENT OF PHOTO PROCESSING EQUIPMENTS CMM TEST CMM CALIBRATION OF CHECKOUT EQUIPMENTS PD PAREN G PAREN FERRET SUBSYSTEM CMM P-1760 PD THREE HUNDRED FIFTY THOUSAND DOLLARS P-100 FUNDS ARE REQUIRED FOR PROCUREMENT OF COMPONENTS OF AIRBORNE FERRET EQUIPMENT FOR SYSTEMS INTEGRATION AND GROUND TEST PD FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS ARE REQUIRED FOR PROCUREMENT OF GROUND TEST CMM CALIBRATION AND CHECKOUT EQUIPMENT PD PAREN H PAREN INFRARED RECONNAISSANCE SUBSYSTEM CMM P-1761 PD FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS ARE REQUIRED TO PROCURE CALIBRATION CMM CHECKOUT CMM AND DATA REDUCTION AND ANALYSIS EQUIPMENT FOR USE IN CONJUNCTION WITH HIGH ALTITUDE MEASUREMENTS FROM BALLOONS AND AIRCRAFT OF JET AND ROCKET EXHAUSTS AND OF EARTH BACKGROUND PD LOCKHEED AIRCRAFT CORPORATION CMM CONTRACTOR PD

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PAREN I PAREN GROUND SPACE COMMUNICATIONS CMM P-1762 PD THREE MILLION DOLLARS P-100 FUNDS ARE REQUIRED FOR PROCUREMENT OF AIRBORNE COMMUNICATIONS EQUIPMENT FOR FLIGHT TEST VEHICLES INCLUDING DATA TRANSMITTERS CMM COMMAND RECEIVERS CMM ENCODERS CMM AND ANTENNAS PD FIVE MILLION SIX HUNDRED THIRTY THOUSAND DOLLARS P-200 FUNDS ARE REQUIRED FOR PROCUREMENT OF GROUND COMMUNICATION CMM ACQUISITION CMM CONTROL CMM TRACKING CMM AND CHECKOUT EQUIPMENT FOR THE FLIGHT TEST PROGRAM PD PAREN J PAREN DATA PROCESSING SUBSYSTEM CMM P-1763 PD FOUR MILLION FIVE HUNDRED THOUSAND DOLLARS P-200 FUNDS ARE REQUIRED FOR PROCUREMENT OF VIDEO SIGNAL RECEIVERS CMM RECORDING EQUIPMENT CMM GEOGRAPHIC REFERENCE EQUIPMENT CMM MINICARD EQUIPMENT CMM ELECTRONIC ORDER OF BATTLE EQUIPMENT CMM AND COMMAND PROJECTION EQUIPMENT PD PAREN K PAREN GEOPHYSICS CMM SUPPORTING PROJECT CMM P-1764 PD FOUR HUNDRED SEVENTY THOUSAND DOLLARS P-100 FUNDS ARE REQUIRED FOR PROCUREMENT OF AIRBORNE ELECTRONIC EQUIPMENT FOR USE IN HIGH ALTITUDE ROCKET SOUNDINGS PD FIFTY THOUSAND DOLLARS P-200 FUNDS ARE REQUIRED FOR PROCUREMENT OF LAUNCHING EQUIPMENT FOR USE WITH NIKE-CAJUN LAUNCHINGS TO INVESTIGATE MICROMETEORITE PHENOMENA IN THE FAR NORTH PD NO PRINCIPAL CONTRACTOR PD PAREN L PAREN FUND TOTALS CMM FY 59 CLN P-100 CMM TWENTY SIX MILLION TWO HUNDRED THOUSAND DOLLARS CMM P-200 CMM EIGHTEEN MILLION TWO HUNDRED FIFTY THOUSAND DOLLARS PD

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MCPTA

7 October 1957

MEMORANDUM TO GENERAL ~~FUNK~~

SUBJECT: Possible Items for Discussion at Lockheed Missile Systems Division

1. In line with your proposed visit to LMSD, submitted below are several items which will probably arise as a result of your discussion with Mr. Carter:

a. Definitization of Letter Contract AF 04(647)-97:

Letter Contract AF 04(647)-97, issued in October 1956, cannot be definitized until a release has been made on the FY 58 program. The contractor has, however, submitted a proposal based upon a definitive work statement forwarded to the contractor by the WSPO in May. The proposal was for the period October 1956 to May 1959 at a cost of $106,000,000. This included a proposed fee of 10%. LMSD is extremely desirous to definitize the letter contract no later than 31 December in order that accrued fee can be shown in the contractor's 1957 financial statement. In this regard, if negotiations commence in early November, there is a possibility that the formal definitive document can be distributed in late December. However, January or February appears to be more realistic. The performance of this contract would be up to, but not including the first firing, which is scheduled in May of FY 59. The contractor has stated that the proposed flight schedule cannot be accomplished since authorization to proceed with a manpower build-up was not authorized on 1 July 1957. Authorization could not be granted due to the lack of a firm program. The WSPO is in the process of reviewing the contractor's proposal to ascertain if costs and manpower projections are realistic even though the proposal will have to be modified once the FY 58 program is determined. It is believed that the contractor's course of action will be to slip the schedule by the number of months necessary to make the current proposal compatible with the FY 58 funds authorized. In reviewing the current proposal, this office has requested the contractor's task sheets and related manpower figures. Mr. Carter has objected to furnishing this information as it is his position that since the information must be changed, the WSPO will be analyzing non-factual cost data. This office does not indorse Mr. Carter's opinion as the amount of effort required will remain about the same. The only change will be the timing.

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WS-117L

b. Contract Fund Status and Expenditure Ceiling:

The contract reflects a face value amount of 15.1 million dollars, of which 12.4 million dollars are P-600 funds. An expenditure ceiling has been imposed upon LMSD in the P-600 area in the amount of 9.6 million dollars. It is further provided that only 4.8 million dollars can be invoiced during the first half of the fiscal year. AMC has imposed a 5% reduction of anticipated billings on the balance (2.6 million dollars P-100 funds). As a result of these expenditure ceilings, and the small amount of funds on contract, the contractor advised by letter dated

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MCPTA
MEMORANDUM TO GENERAL FUND (Contd) 7 October 1957
SUBJECT: Possible Items for Discussion at LMSD

30 September 1957 that 85% of present contract funds will be reached by 1 November 1957. The WSPO anticipates that additional funds can be provided by 1 November if formal release on the FY 58 program is given by 15 October 1957. Additional funds will also provide relief to the contractor on expenditures with respect to P-100 type funds.

c. LMSD Test Plan:

The contractor was advised by letter dated 23 September 1957, copy attached, that the LMSD test plan was unacceptable. The main objection was in the fact that LMSD proposed to do a significant portion of in-house testing and manufacturing for items which probably could be subcontracted. In order to do in-house testing, the contractor's test plan requested Government facilities in the amount of approximately $3,000,000. The contractor had been advised on numerous occasions that no Government facilities were available for the WS 117L program. The Contractor Selection Board selected Lockheed based on the fact that Government facilities would not be furnished. The facilities clause of the contract also states that no Government facilities will be furnished other than items available in the industrial reserve.

James S Seay

1 Incl
Cy of letter to LMSD
dtd 23 Sep 57 (UNCL)

JAMES S. SEAY
Lt Colonel, USAF
Chief, WS 117L Branch
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

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AIR FORCE BALLISTIC MISSILE DIVISION

SEP 23 1957

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SUBJECT: [illegible] Policy Review of LAC/MSD Report [illegible] [illegible] Test Plan and Related Facilities and [illegible]

TO:
Lockheed Aircraft Corporation
Missile Systems Division
ATTN: Mr. L. E. Root
P. O. Box 504
Sunnyvale, California

WS-117L

1. This letter represents the Air Force Ballistic Missile Division policy and general comments resulting from a review of the LMSD Report [illegible]. Policy statements will be made on two aspects of this document. First on the test plan and test philosophy and second on the equipment which LMSD has indicated they anticipate will be procured from the supplies contract funds.

2. Test Plan and Test Philosophy

The comments that follow are derived from something more basic than a test plan and philosophy; they involve the system development philosophy. LAC/MSD has been designated as the Prime [illegible] Contractor for WS 117L. This does not mean that LAC/MSD is expected to perform R&D, design, manufacture and test of the many components of the system. It is considered that such an approach would be both time-consuming and expensive. The present approach of LMSD is deemed to lean too far in this direction. The extent of this "in-house" development trend is further confirmed by the disproportionate share of costs as reflected in the contractor's latest proposal. Therefore the following philosophy should be immediately implemented by LAC/MSD in the development and test of the WS 117L system.

a. Component parts to include entire subsystems of WS 117L, should be procured through the medium of subcontractors or vendors who have the capability, including personnel, facilities and experience to develop and manufacture the class of equipment to be procured. For example, there are many commercial concerns who are experienced in the areas of autopilots, hydraulic actuators, the associated transistorized electronic gear, infrared detectors, solar cells, guidance systems, radars, etc. Work retained for "in-house" development or manufacture by LMSD should be only that where a critical comparison with other sources indicates an existing superior capability.

b. Parts, components, subassemblies and subsystems should be procured by LMSD/AF in accordance with LMSD prepared specifications which include a test plan for the testing of the [illegible] subassembly or subsystem procured. Technical [illegible] placed on subcontractor facilities for test [illegible] of the subcontractor developed equipment.

c. LMSD role as Prime Weapon System Contractor is to provide for that integrated weapon system development and for procurement and installation of certain portions of weapon systems, including necessary planning and scheduling, under the supervision and final authority of the Air Force. It is stated Air Force policy that: "owing to the increased technical complexity of present day weapon systems, subsystems and equipment, the increased necessity for obtaining compatibility and integration of the various subsystems and equipments in a weapon system, the normal practice of the Air Force will be to accomplish weapon system development through weapon system contractors". It is also Air Force policy that sufficient control will be exercised over weapon system contractors to insure that:

(1) "A vigorous and healthy equipment industry is maintained".

(2) "A proper industrial base in the equipment industry is maintained to provide for rapid production expansion in the event of mobilization".

(3) "Only reasonable profits and costs are allowed".

(4) "Government-recognized standards are used to the maximum practicable extent".

(5) "Duplication of development is avoided".

4. The complex nature of WS 117L and the unusual demands for reliability imposed by its operational concept and environment do establish a requirement for a carefully planned and executed test program. Further, the scope of WS 117L has involved the system in practically every field of technology each of which will be used to the ultimate state-of-the-art. The Air Force does not anticipate the development of the Lockheed Aircraft Corporation as experts in each of these fields of technological endeavor. The development philosophy expressed in the preceding paragraphs is herein extended

to the testing of part, component, subassembly, subsystem of WS 117L. Whether the part, component etc., procured on a subcontract will be tested by that subcontractor to meet the specifications as to reliability, environment and operation as specified. LMSD will be responsible for the integration and assembly of these tested parts, components, subassemblies and subsystems into an integrated WS 117L, and will be responsible for the system testing of WS 117L together [illegible] and/or vendor. Lockheed Aircraft Corporation [illegible] at Lockheed Aircraft Corporation facilities [illegible] of subcontractor supplied parts,

3. Special Test Equipment

LMSD management representatives stated during the course of negotiations which led to Letter Contract AF 04(647)-97, that no Government procured facilities would be required at the contractor's plant. This position by LMSD had a considerable influence in determining who received the contract award. Contract AF 04(647)-97 specifically states (Part IV, Item A) "it is contemplated that the contractor shall furnish industrial facilities and plant equipment required in the performance of this contract". Part IV of the contract further defines the terms used in this part as being those contained in the ASPR. Most of the equipment listed in LMSD proposal as "special test equipment" is not considered to fall within the ASPR definition. Most of the equipment listed is composed of standard or facility type items used together for a specific purpose as is normal in any laboratory or development program. It has been determined after considerable consultation within the Air Force that ASPR definition must be applied to the components and not the assembly. Therefore, the following are stated as Air Force and [illegible] policy:

a. When an entire assembly, including its major components is developed especially to perform or test a WS 117L part, component, subassembly or subsystem, or the complete 117L system, then it is a proper charge to the supply contract. When a component of an overall test assembly would require substantial modification to be suitable for other use, it is also special and chargeable to the supply contract. In this category are dies, jigs, fixtures, special distribution panels, specially fabricated consoles, the S.T.F. superstructure (i.e. that part actually tailored to a particular vehicle).

b. Test consoles and inspection equipment such as those defined in LMSD [illegible], inclosures B and C, will be assembled wherever possible in such a manner that major component parts do not lose their identity or usefulness as general purpose equipment. (Example Oscillograph Midw. Model 581 is still an Oscillograph). These items that fall in the definition of standard items, facilities and installation equipment will not be approved for purchase with supply contract funds.

2. The fact that a given item of equipment will be employed during [illegible] of the program does not make it "special [illegible] from the fact that [illegible] may not have a suffi- [illegible] item to meet all its requirements. These [illegible] not be allowed as direct charges to the [illegible]

[illegible] approved the design study of items K, L, [illegible] the Administration [illegible] does not imply approval of the manufacture of these items as "special test equipment" "en toto". These items are not sufficiently well defined in Item 3 [illegible] to make this determination. Some items such as the flame deflection plate and water distribution system, water deluge and CO_2 distribution systems, visual monitor system and others may not warrant the "special" classification "en toto". Similar parts of items M, N, and O referenced above may not warrant the "special" classification.

5. The policies expressed in this letter should be incorporated in the long range planning for WS 117L testing immediately. Provisions relating to facilities and special tooling, which are now in the letter contract, will be contained in the definitive contract and will be compatible with the above interpretation.

cc: [illegible] H. [illegible]

SIGNED

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

WDTR
Col. Riepe

is
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Date: 8 Oct 1957

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FM HED USAF WASH DC
TO COMDR AFBMD /ARDC/ INGLEWOOD
COMDR BMO /AMC/ INGLEWOOD
INFO COMDR ARDC BALTO MD
BT

/~~SECRET~~/FROM AFCGM. CITE 51210. PERSONAL FOR GEN RITLAND FROM GEN MCCORKLE. REQUEST ADVICE AS SOON AS POSSIBLE AS TO ANY RECOMMENDED ACTIONS AND THE ESTIMATED RESOURCES REQUIRED THEREFOR THAT COULD BE INITIATED TO FURTHER ACCELERATE THE ICBM/IRBM PROGRAMS. CONSIDERATIONS INCLUDE ADVISABILITY OF INCREASING SIZE OF IOC FORCE, ADVANCING SCHEDULES BY SIX PLUS MONTHS, EMPLOYING ALTERNATIVE BASE CONSTRUCTION CONCEPTS, I.E., SOFT VS HARD FOR TITAN UNITS, ETC. ESTIMATED RESOURCES NEED NOT BE LIMITED TO FY 59 BUDGET CYCLE AND MAY INCLUDE INCREASES OF CURRENT FISCAL YEAR. INFO IS DESIRED BY CHIEF OF STAFF FOR POSSIBLE HIGH LEVEL DISCUSSION. ADVISE SOONEST DATE REPLY CAN BE FURNISHED. ANTICIPATED SIMILAR INFO WILL BE REQUESTED REGARDING WS-117L PROGRAM. SUGGEST PREPARATORY ACTION ACCORDINGLY

BT
THIS IS AN AC MESSAGE
08/2137Z OCT RJWPNF

"AC—PARAPHRASING NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION—NO UNCLASSIFIED REFERENCE IF DATE-TIME GROUP IS QUOTED."

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S

AF ITEM ① X ~~SECRET~~/
FOLLOWING IS TWX DISPATCHED TODAY--
REQUEST ADVICE AS SOON AS POSSIBLE AS TO
ANY RECOMMENDED ACTIONS AND THE ESTIMATED
RESOURCES REQUIRED THREFORE THAT COULD
BE INITIATED TO FURTHER ACCELERATE THE
ICBM/IRBM PROGRAMS. CONSIDERATIONS SHOULD
INCLUDE ADVISABILITY OF INCREASING SIZE
OF IOC FORCE8 ADVANCING SCHEDULES BY SIX
PLUS MONTHS8 EMPLOYING ALTERNATIVE BASE
CONSTRUCTION CONCEPTS8 I.E. SOFT VS HARD
FOR TITAN UNITS8 ETC8 ESTIMATED RESOURCES
NEED NOT BE LIMITED TO FY 59 BUDGET CYCLE
AND MAY INCLUDE INCREASES IN CURRENT FISCAL
YEAR. INFO IS DESIRED BY CHIEF OF STAFF
SOONEST DATE REPLY CAN BE FURNISHED.
ANTICIPATED SIMILAR INFO WILL BE REQUESTED
REGARDING WS-117L PROGRAM8 SUGGEST PREPARATORY
ACTION ACCORDINGLY.
END USAF ITEM 1 X~~SECRET~~/

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"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

~~CONFIDENTIAL~~

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ND BY

RGR
USAF ITEM ②~~SECRET~~/
IF AT ALL POSSIBLE DESIRE YOU PROVIDE
ROUGH ESTIMATES IMMEDIATELY FOR PRELIMINARY
DISCUSSION BY C/S AT NSC MEETING
AM 10 OCT. SUBJECT OF MEETING PRIMARILY
SATELLITE BUT HAS OBVIOUS ICBM/IRBN
IMPLICATIONS. DO YOU HAVE ANY QUESTIONS QUES
END USAF ITEM 2/~~SECRET~~/

②

"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

AFBMD ITEM 1 ✓ /~~SECRET~~/
WILL TAKE A QUICK LOOK-
HAVE ANTICIPATED SOME OF YOUR QUESTIONS
BUT ANSWERES NOT IMMEDIATELY AVIAIABLE.
ESTIMEAT PRELIMINARY ANSWER CAN BE
AVAILABLE WED PM VIA TWX.
THIS ALSO ANSWERES UR ITEM 2.

DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted] ~~CONFIDENTIAL~~

END AFBND ITEM 1 AND 2 /S C R ET/

TC>2

[redacted] ~~CONFIDENTIAL~~

USAF ITEM 3/~~SECRET~~/
WE DO NOT KNOW EXACT BACK GROUND OF ITEM 1
REQUEST. WE GUESS THAT IT IS ONLY FOR PURPOSES
OF BING PREPARED IN CASE TOP AUTHORITIES
ASK WHAT WE NEED FOR OUR PROGRAMS. BASIS
OF COURSE IS IMPLICATIONS OF SOVIET SATELLITE
ACCOMPLISHMENTS8 WITH RESULTING POSSIBILITY
OF DEMANDS ON OUR OWN BALLISTIC MISSILE
YOUR BEST FIRST GUESSES8 AS 5-4288& PIECE
FOR OUR CHIEF TO INITIATE CONVERSTIONS
WHICH MIGHT LEAD TO FUNDING OUTSIDE NORMAL
PROGRAM LIMITATIONS.
END USAF ITEM 3/~~SECRET~~/

3

"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

[redacted]

AFBMD ITEM 3 /~~SECRET~~/
AFBMD UNDERSTAND BACKGROUND OF
SITUATION AND WILL EXERT MAXIMUM
EFFORT FOR PRELIMINARY ANSWER.
END ITE 3 /~~SECRET~~/

GA
USAF ITEM 4/~~SECRET~~/
WE IN CONFERRING GROUP ARE THINKING IN TERMS
OF HOW MUCH IMPACT THESE RECENT DEVELOPMENTS
MIGHT HAVE TOWARD BREAKING FUNDING RESTRICTIONS.
IT COULD BE POSSIBLE TO GAIN AS MUCH AS
200-250 MILLION FY 1958 AND 300-500
MILLION FY 1959 IF SUFFICIENT NATIONAL
IMPETUS WERE PLACED ON THESE PROGRAMS8
INCLUDING 117L. WE WANT TO BE PREPARED TO STATE
WHAT WE COULD DO WITH THE FOREGOING
CMA OR LESSER AMOUNTS CMA SHOULD THEY BE MADE AVAILABLE.
END USAF ITEM 4/~~SECRET~~/

4

~~SECRET~~ ~~CONFIDENTIAL~~

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CONFIDENTIAL

AFBMD ITEM 4 /~~SECRET~~/
AFBMD UNDERSTANDS RE FUNDING RESTRICTIONS
PD FUNDS REQUIRED FY 58-59
WILL BE THOSE COMMENSURATE WITH
MAX TECH EFFORT CMM FACILITY BUILDUP
CMM OPERATION TRAINING AND
RECOMMENDED IOC BUILD UP.
END AFBMD ITEM 4 /~~SECRET~~/

USAF ITEM 5/~~SECRET~~/
REUR ITEM 1 REPLY BY WED EVE NOT SOON ENOUGH/
YOUR BEST FIRST ESTIMATES NEEDED HREE
BY TOMORROW AM WITH
REFINEMENTS AS SOON THERE AFTER AS POSSIBLE
END USAF ITEM 5/~~SECRET~~/

"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

AFBMD ITEM 5 /~~SECRET~~/
WE WILL REPEAT WILL GET SOMETHING
OUT EARLY WEDNESDAY. OUR FULL EFFORT WILL BE
ASSSIGNED TO THIS TASK.
END AFBMD ITEM 5 /~~SECRET~~/

ARE U STIL THERE BA485AS'

AFBMD ITEM 6 /UNCLAS/
THAT IS ALL HERE. ATEEE
ACTION IS UNDER WAY.
END AFBMD ITEM 6 /UNCLAS/

THATS ALL FROM HERE GAPLS

RGR AND OUT

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BA 485 V INGL 2382
PLS RELAY FOL MSG TO COFS ATTN AFCBEEE AFCGM GEN MCCORKLE

O 090928Z
FM COMDR AFBMD HQ ARDC INGLEWOOD CALIF
TO COFS USAF WASHDC
INFO COMDR ARDC BALTO
BT

WS 117L see part 5 2d page (6th " msg)

/~~S E C R E T~~/ COFS FOR AFCGM-WOG-10-3-E
REFERENCE TELECON 8 OCTOBER 1957 FROM GENERAL MCCORKLE TO GENERAL RITLAND WHICH REQUESTED A MAXIMUM PROGRAM EFFORT AND ESTIMATED RESOURCES REQUIRED FOR FY 58 AND FY 59 TO FURTHER ACCELERATE THE ICBM AND IRBM PROGRAMS. INCLUDED IS ESTIMATE FOR WS 117L. FOLLOWING MESSAGE IN 7 PARTS CLN
PART I - GENERAL
ALL INFORMATION ON THE ATLAS CMM TITAN CMM AND THOR PROGRAMS ARE IN CONJUNCTION WITH ACCELERATION FROM THE BASE OF THE MACINTYRE ACCELERATED PROGRAM CONTAINED IN THE AFBMD BALLISTIC MISSILE DEVELOPMENT PLAN DATED 15 SEPTEMBER 1957. INCREASED COSTS REQUIRED

[redacted] ~~CONFIDENTIAL~~

PAGE TWO RJWPNF 1
FOR ACCELERATION ARE BASED ON AN ASSUMPTION OF APPROVAL TO INCREASE PROGRAM EFFORTS EFFECTIVE 1 NOVEMBER 1957. R&D PROGRAMS CANNOT BE ACCELERATED BEYOND DATES MENTIONED BELOW. SMALL FUND INCREASES HAVE BEEN INCLUDED WHERE NECESSARY IN OUR OPINION TO COUNTERACT AUSTERE APPROACH OF RECENT PROGRAMMING EXERCISES. THE FOLLOWING INFORMATION IS CONSIDERED PRELIMINARY.
PART 2. ATLAS
A. THE EARLY DEVELOPMENT PHASE OF THE PROGRAM CAN NOT BE IMPROVED AND HENCE THE ACTIVATION OF THE INITIAL INCREMENT OF THE IOC CAN NOT BE ADVANCED BEYOND THE PRESENT OPERATIONAL DATE OF JULY 1959. ALTHOUGH DEVELOPMENT MILESTONE DATES CAN NOT BE SIGNIFICANTLY ADVANCED CMM SOME OPPORTUNITY EXISTS FOR INCREASING THE QUALITY OF THE TEST PROGRAM AND GIVES GREATER ASSURANCE OF MEETING SCHEDULED DATES. THIS WOULD BE ACHIEVED BY THE APPLICATION OF ADDITIONAL PEOPLE CMM OVERTIME AND BACKUP PROGRAMS IN SELECTED CRITICAL AREAS. IT IS ESTIMATED THAT THIS MEASURE WILL REQUIRE $26.9 MILLION IN FY 58 AND $23.9 MILLION IN FY 59.
B. THE INITIAL PHASE OF THE IOC IS LIMITED PRIMARILY BY HARDWARE AND TRAINING CONSIDERATIONS. BEYOND THIS POINT THE LIMITING FACTOR BECOMES THE CURRENTLY FIXED PRODUCTION RATE OF 4 MISSILES PER MONTH. LIFTING OF THIS RESTRICTION WILL ENABLE A MORE RAPID ACTIVATION OF LATER SQUADRONS AND ALLOWS COMPLETION OF 5 SQUADRONS IN THE SAME TIME

~~CONFIDENTIAL~~ [redacted]

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

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#48

PAGE THREE RJWPNF 1

PERIOD PRESENTLY REQUIRED FOR 4. THIS WOULD RESULT IN A COMPOSITE SQUADRON AT CAMP COOKE AND A COMPLETE WING OF 4 SQUADRONS AT WARREN AFB BY JULY 1961. THUS ONE ADDITIONAL SQUADRON WILL BE AVAILABLE WITHIN THE SAME TIME PERIOD. FUNDS REQUIRED FOR THIS FORCE INCREASE ARE $2.0 MILLION FY 58 AND $32.8 MILLION FY 59 FOR MISSILES AND EQUIPMENT AND $2.0 MILLION FY 59 MCP FOR DESIGN OF THE 4TH SQUADRON AT WARREN.

C. ALTHOUGH THE ACTIVATIONS INDICATED IN THE PRECEDING PARAGRAPH ARE THE MAXIMUM ATTAINABLE BECAUSE OF GSE AND CONSTRUCTION LIMITATIONS CMM MISSILE PRODUCTION CAN BE INCREASED TO AUGMENT THE UNIT EQUIPMENT AND PROVIDE ADDITIONAL FORCE CAPABILITY ON A RELOAD CAPABILITY. WITH A PRODUCTION RATE OF SIX MISSILES PER MONTH COMMENCING SEPTEMBER 1959 CMM IT IS POSSIBLE TO PROVIDE A UE OF 12 MISSILES RATHER THAN THE PRESENT 10. THIS INCREASE WOULD REQUIRE ADDITIONAL FUNDING OF $15.8 MILLION IN FY 59.

D. PRESENT PLANNING DEFERS CONSTRUCTION OF A THIRD COMPLEX AT CAMP COOKE AND PROVIDES THREE FULL SQUADRONS AT WARREN AFB. AS INDICATED ABOVE CMM ONE ADDITIONAL SQUADRON CAN BE ACTIVATED AT WARREN AFB BY JULY 1961. HOWEVER CMM AT THAT TIME CMM THE CAPACITY OF CAMP COOKE TO TRAIN AND RETRAIN OPERATIONAL CREWS WILL BE EXCEEDED CMM AND ONE ADDITIONAL COMPLEX WILL BE REQUIRED AT CAMP COOKE. CONFIGURATION OF THIS COMPLEX SHOULD BE HARD OR SOFT DEPENDING ON THE NATURE OF THE

[redacted]

PAGE FOUR RJWPNF

FOLLOW-ON FORCE. DECISION DATE FOR THIS COMPLEX WOULD BE NOT LATER THAN JUNE 1959 WITH CONSTRUCTION FUNDING IN THE FY 60 MCP.

E. IT IS NOTED THAT TO ACCOMODATE THE WS-117L PROGRAM SIXTEEN MISSILES ARE INCLUDED IN THE PRODUCTION PROGRAM THROUGH FY 61. FURTHER CMM ONE LAUNCH COMPLEX AT AFMTC WILL BE LOANED TO WS-117L FROM MAY - DECEMBER 1959. ALL FUNDING FOR THIS PROGRAM IS INCLUDED WITHIN THE WS-117L PROGRAM AND IS NOT COVERED UNDER WS 107A-1.

PART 3. TITAN PROGRAM

A. AN AUGMENTATION OF THIRTY MILLION DOLLARS IN FY 58 FUNDS AND SEVENTY MILLION DOLLARS IN FY 59 FOR THE TITAN PROGRAM WILL PROVIDE AN ACCELERATION OF THE COMPLETION DATE FOR FULLY EQUIPPING THE IOC GROUP FROM JULY 1962 TO JANUARY 1962. REVIEW OF PROGRAM SCHEDULES INDICATES THAT THE CRITICAL DATE ON THIS PROGRAM IS AVAILABILITY OF DESIGN CRITERIA FOR CREW TRAINING AND OPERATIONAL BASE FACILITIES IN AUGUST 1958. BECAUSE OF THIS FACT CMM SHORTER LEAD TIMES ON SOFT VERSUS HARD BASE CONSTRUCTION OFFERS NO ADVANTAGES IN ADVANCING THE FIRST OPERATIONAL DATE OF MAY 61.

B. THE ABOVE PROGRAM WILL REQUIRE THE FOLLOWING ACTIONS CLN /1/ MAXIMIZE EFFORTS TO OBTAIN DESIGN CRITERIA FOR CREW TRAINING AND OPERATIONAL BASE FACILITIES PRIOR TO AUGUST 1958. /2/ INCREASE R&D TEST FIRING RATE ABOVE THREE PER MONTH IN FY 1960. /3/ REACTIVATE

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PAGE FIVE RJWPNF 1

THE ACTION TO COMPLETE TEST STAND NUMBER 20 AT AFMTC. /4/ ACTIVATION OF TEST STAND D-4 AT MARTIN IN CY 1959. /5/ INCREASE NUMBER OF TRAINING STANDS AT COOKE AFB FROM THREE TO FOUR. 6/ DECREASE CREW TRAINING PERIOD FROM FOUR TO THREE MONTHS. /7/ APPROVAL OF IOC SITE SELECTION IN JANUARY 1958. /8/ APPROVAL OF SIMULTANEOUS CONSTRUCTION OF IOC SQUADRON SITES. /9/ APPROVAL OF MAXIMUM TITAN PRODUCTION RATE OF SIX PER MONTH BEGINNING APRIL 1961 TO PROVIDE INCREASE IN NUMBER OF MISSILES PER SQUADRON FROM TEN TO TWELVE.

PART 4. THOR PROGRAM

A. AN AUGMENTATION OF TWENTY MILLION DOLLARS IN FY 58 FUNDS AND SIXTY-FIVE MILLION DOLLARS IN FY 59 FOR THE THOR PROGRAM WILL PROVIDE THE FOLLOWING ACCELERATION FOR THE IOC. AN INCREMENT OF THE FIRST SQUADRON COULD BE DEPLOYED OVERSEAS IN APRIL 59 AND FULLY EQUIPPED BY AUGUST 59. SQUADRONS WOULD BE DEPLOYED AT THREE-MONTH INTERVALS WITH FOUR FULLY EQUIPPED SQUADRONS IN PLACE BY MAY 60. THIS REPRESENTS ADVANCES IN THE FULLY EQUIPPED DATES WITH RESPECT TO THE 15 SEPTEMBER PLAN OF FOUR MONTHS FOR THE FIRST SQUADRON AND EIGHT MONTHS FOR THE FOURTH SQUADRON. /UNDER THIS SCHEDULE CMM TWO THOUSAND NAUTICAL MILES RANGE CAPABILITY COULD BE PROVIDED WITH THE THIRD SQUADRON. TO ACHIEVE THIS TWO-THOUSAND-MILE CAPABILITY CMM TEN MILLION DOLLARS ADDITIONAL

PAGE SIX RJWPNF 1

IN FY 59 FUNDS WOULD BE REQUIRED. THE NEXT MONTHLY MANAGEMENT REPORT WILL CONTAIN THE REQUEST FOR THIS FY 59 FUNDING WHICH IS REQUIRED TO ACHIEVE THIS ADDITIONAL CAPABILITY UNDER THE 15 SEPTEMBER PLAN./ THE DOLLAR FIGURES INDICATED FOR FY 58 AND FY 59 INCLUDE THE MONIES REQUIRED TO INCREASE THE INDUSTRIAL BASE TO PROVIDE FOR MAXIMUM DELIVERIES OF EIGHT MISSILES PER MONTH BY JULY 59. WITH THIS CAPABILITY CMM AN EIGHT SQUADRON IOC FULLY EQUIPPED WITH 120 MISSILES COULD BE IN PLACE OVERSEAS BY MAY 61. A FURTHER ADDITION OF TEN MILLION DOLLARS IN FY 59 FUNDING WILL BE REQUIRED TO INITIATE IMPLEMENTATION OF THE ADDITIONAL 4 SQUADRONS TO COMPLETE 8 SQUADRONS IOC MENTIONED ABOVE.

PART 5. WEAPON SYSTEM 117L

A. REFERENCE IS MADE TO WS 117L DEVELOPMENT PLAN DATED 16 JULY 1957 PRESENTLY IN DCS/D AFDRD-SS FOR REVIEW AND APPROVAL. THE ACCELERATED PROGRAM PROPOSED HEREIN FOLLOWS THE PROPOSAL CONTAINED IN REFERENCED DEVELOPMENT PLAN EXCEPT THAT THE FIRST ATTEMPT AT ORBITAL FLIGHT IS IN SECOND QUARTER CALENDAR YEAR 1959 INSTEAD OF FOURTH QUARTER CALENDAR YEAR 1959. IN ADDITION CMM THE 16 JULY DEVELOPMENT PLAN ASSUMED A MID- CY 57 CONTRACTOR GO-AHEAD. LACK OF PROGRAM APPROVAL TO DATE HAS RESULTED IN A GENERAL TIGHTENING OF THE DEVELOPMENT EFFORT AND REQUIRES ADDITIONAL FUNDS TO RECOVER LOST TIME. FURTHER CMM

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PAGE SEVEN RJWPNF 1
WS 117L FUNDING HAS BEEN MODIFIED TO INCLUDE THE COST OF ATLAS BOOSTERS IN FY 1958 AND MCP REQUIREMENTS WHICH MUST NOW BE MOVED INTO FY 1958 TO MEET ACCELERATED PROGRAM. ADDITIONAL ASSUMPTIONS PERTINENT TO THESE FIGURES IN THE ACHIEVEMENT OF THIS SCHEDULE ARE AS FOLLOWS CLN
/1/ THE BASIC RECONNAISSANCE REQUIREMENT IS UNCHANGED EXCEPT AN EARLY DEMONSTRATION OF LARGE SATELLITE CAPABILITY IS DESIRED.
/2/ THE AIR FORCE SATELLITE PROGRAM IS GRANTED THE PRIORITY AND MANAGEMENT AUTHORITY RECOMMENDED IN TOP SECRET LETTER DATED 10 SEPTEMBER 1957 FROM COMMANDER AFBMD TO COMMANDER ARDC CMM SHORT TITLE CLN PROTARS CMM CONTROL NO. WDD-57-TS-75 CMM WHICH HAS BEEN TRANSMITTED BY FIRST INDORSEMENT TO DCS/D CMM HQ USAF.
/3/ INITIAL R&D /ORBITAL/ LAUNCHINGS WILL BE MADE FROM PATRICK AFB IN MID 1959 AND WILL BE FOLLOWED IN LATE 1959 BY HIGH LATITUDE ORBITAL LAUNCHINGS FROM COOKE AFB.
B. TOTAL FUNDING REQUIREMENTS FOR THIS PROGRAM ARE CLN
FY 1958 - $99.2 MILLION
FY 1959 - $121.7 MILLION

End WS117L

PART 6. SUPPORT AREAS

~~SECRET~~

PAGE EIGHT RJWPNF 1
A. CENTER SUPPORT AREA. TO INSURE MEETING R&D SCHEDULES AT AFMTC AND AFFTC CMM ADDITIONAL FUNDS REQUIRED ARE CLN
FY 1958 - $3.2 MILLION
FY 1959 - $4.3 MILLION
B. COOKE LAUNCH AREA INSTRUMENTATION.
/1/ IMMEDIATE DECISION ON PERMISSION TO FIRE FROM COOKE AFB WITH RELEASE OF $1.983 MILLION IN FY 1958 FUNDS AS REQUESTED IN TWX TO HQ USAF WDCB-7-3-E DATED 5 JULY 1957 FOR COOKE AFB INSTRUMENTATION AND RANGE SAFETY SYSTEM.
/2/ ADDITIONAL REQUIREMENT OF $0.5 MILLION IN FY 1959 FUNDS TO COVER EXPEDITING REQUIRED IN INSTALLING INSTRUMENTATION AND INCREASED REQUIREMENTS FOR ADDITIONAL SAFETY INSTRUMENTATION.
C. WEST COAST DOWNRANGE IMPACT AREA FOR ICBM. REQUIRES APPROVAL OF NAVY PLANS FOR EXTENDED WEST COAST RANGE TO THE EXTENT REQUIRED TO SUPPORT BMD IMPACT REQUIREMENTS. THESE HAVE BEEN TENTATIVELY IDENTIFIED AS /58/ $2.0 MILLION FOR NAVY SOUTH COOKE AND $6.2 MILLION /FY 58/ FOR DOWNRANGE IMPACT AREAS SMCLN FY 59 $1.2 MILLION FOR OPERATING COSTS.
D. TRAINING. NECESSARY ACTION WILL BE REQUIRED BY NOT LATER THAN 1 NOVEMBER 1957 TO APPROVE AND AUTHORIZE THE ALLOCATION OF FUNDS

[redacted] ~~CONFIDENTIAL~~

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REQUIRED FOR PHASE II TRAINING FACILITIES AS OUTLINED IN LETTER CMM HQ CMM ATC CMM SUBJECT CLN "FACILITIES REQUIREMENT ESTIMATES FOR MISSILE TRAINING" CMM DATED 7 MAY 1957 /APPROXIMATELY $15.0 MILLION/. A&E AND DESIGN SPECIFICATION CONTROL WILL CONTINUE TO BE EXERCISED BY AFBMD.

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E. MANPOWER. IN CONSONANCE WITH THE ABOVE PROGRAMS. THE PHASING OF MANPOWER REQUIREMENTS WILL HAVE TO BE EXPEDITED FOR THE IOC PROGRAM. THIS REQUIREMENT IS GENERATED BECAUSE OF THE MORE RAPID BUILD-UP IN TACTICAL UNITS AND THE NEED FOR A COORESPONDING BUILD-UP IN SUPPORT UNITS AT AN EARLIER DATE. IN ADDITION CMM THE AFBMD WILL REQUIRE IMMEDIATE AUGMENTATION IN PERSONNEL AUTHORIZATIONS TO PROVIDE THE ADDITIONAL NECESSARY MANAGERIAL CONTROL FOR THE EXPANDED PROGRAM.

F. IRBM SITE SELECTION. URGENT FY 58 BUDGETING AND SITE SELECTION ACTION FOR OVERSEAS SITES IS REQUIRED BY SAC FOR REALIZATION OF THE SM 75 PROGRAM.

PART 7

RECAPITULATION OF ADDITIONAL FUND REQUIREMENTS

	FY 58	FY 59
ATLAS	28.9	74.5
TITAN	30.0	70.0
THOR	20.0	85.0
WS 117L	99.2	121.7
SUPPORT	5.2	4.8
TRAINING COMMAND	15.0	0
AIR FORCE TOTAL	198.3	356.0
ADDITIONAL NAVY FUNDING	8.2	1.2

BT

C PLS ADD CITE NBR AFTER /~~S E C R E~~ T/ WDG-10-3-E
09/1020Z OCT. RJWPNF

RGR REC THE WHOLE CLASS MSG VIER
PLS CALL US COLLECT AT 1600Z OR 1530Z AND GIVE US ZFF2
ON THIS TO COFS PLS
ACK
RGR WILL DO

"AC—PARAPHRASING NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION—NO UNCLASSIFIED REFERENCE IF DATE-TIME GROUP IS QUOTED."

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CONFIDENTIAL

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Ballistic Missile Div.
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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

SCIENTIFIC ADVISORY BOARD TO THE CHIEF OF STAFF, USAF

REPORT OF THE SCIENTIFIC ADVISORY BOARD AD HOC COMMITTEE
ON
ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT

OCTOBER 9, 1957

Report on
meetings of
29-31 July 1957
at RAND Corp

All WDTR
memo for Col Terhune
1 Aug 57 subj
1st meeting of the SAB
Ad Hoc Com on
Advanced Weapons
& Environment
29-31 Jul 57

This document consists of 28 pages

Copy 59 of 130 copies.

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DECLASSIFIED. DOD DIR 5200.10

~~SECRET~~

WD 57 04614

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

9 October 1957

NOTICE TO ALL AIR FORCE ADDRESSEES

1. This Scientific Advisory Board report is forwarded directly in order to make it available for your information at the earliest possible date. However, any comments on, or action desired as a result of this report should be handled through established military command channels. May we remind you of the following documents governing action on SAB reports:

(1) All Air Force personnel - AFR 20-30

(2) Hq USAF personnel - Consult DCS/D HOI 11-24 (15 Feb 57)
(Contact Major Philip B. Anderson, Jr., AFDRD-EX)

(3) Hq ARDC personnel - Consult Memo of 2 April 1957, from the Executive Office of the Commander addressed to the Staff, Hq ARDC (Contact Lt Col L. Robinson, RDGPL)

(4) ARDC Center personnel - Consult TWX RDGPLC 3-39-E dated 29 March 1957 from Hq ARDC to all Centers.

CHESTER N. HASERT
Technical Director
Scientific Advisory Board
Office of the Chief of Staff

[redacted] ~~CONFIDENTIAL~~

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

REPORT OF THE SCIENTIFIC ADVISORY BOARD AD HOC COMMITTEE ON ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT

OCTOBER 9, 1957

Introduction

By letter of 15 May 1957, Lt. General D. L. Putt, Deputy Chief of Staff, Development, United States Air Force, requested the Chairman of the Scientific Advisory Board to establish a special study group to conduct a review of the problems of national defense in cis-lunar space, with particular regard to their impact on future weapons technology and the operating environment in which these weapons might function. Accordingly, the Chairman of the SAB Board established the Ad Hoc Committee on Advanced Weapons Technology and Environment. This Committee met at the RAND Corporation on 29, 30, 31, July 1957 and was briefed by the Air Force and industry representatives. This is a report of the Committee.

General Putt's letter, the Committee membership, and the agenda of the briefings are attached as Appendices 1, 2, and 3.

Scope of the Report

The subject matter considered by this Committee covers a range from specific military weapons systems to scientific experiments. The weapon systems themselves deal with projects from those, such as the ICBM, already under active development to others that are more theoretical

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possibilities. The technical developments range from the various technical arts that underlie future military weapons systems to exceedingly pure research into the nature of the universe. In addition, it is apparent that an intelligent survey of this subject requires consideration not only of technical and military systems questions, but also of certain aspects of organization. This is so because the scientific and engineering factors are often so new or so entwined that a separate or special organization is needed to attack them. Accordingly, this report is divided into a number of major parts as follows:

1. Military Weapons Systems
2. Other Potential Military Uses of Space Technology
3. Scientific Research and Exploration of Space
4. Organization
5. Some General Comments

1. Military Weapons Systems

The military weapons considered by the Committee, which have already had some degree of weapons system study, include ballistic missiles, reconnaissance satellites, manned and unmanned boost-glide vehicles, pseudo-satellites or satelloids, and anti-ballistic missiles, as described later in this report.

a. Ballistic Missiles

In the opinion of the Committee, ballistic missiles continue to deserve top priority over all these military weapons systems for future Air Force development. A survey of future possibilities indicates very definitely that technical and mission extensions of present ICBM's exist. In fact, there are two quite different paths of development which would lead to two distinctly different second generation ballistic missiles. More specifically, by one program of research and development, it would be possible for the nation to have future ICBM's which, on a relative basis, are smaller, simpler, more accurate, of adequate range, and more highly effective, and will lend themselves to better readiness, dispersal, mobility, and economical high-rate production than the present ICBM's under development. On an absolute basis, such second generation ICBM's could provide capabilities of destroying hard targets with high probabilities. A somewhat different program of research and development which might parallel the first could provide second generation missiles having payload and range capabilities considerably greater than the first generation of the ICBM.

Both of these research and development programs would involve considerable improvements in guidance techniques leading to greater accuracy, expected advances in nuclear weapons technology leading to higher yield-to-weight ratios, and improvements in nose cone technology leading to higher speed, lower dispersal re-entry, as well as advanced staging and structural techniques. The first or smaller missile development program would take advantage either of recent improvements and expected development gains in solid propellant efficiency together with clustered multistaging designs, or a liquid propellant of improved thrust-density performance probably of a storable type, with a motor of considerably increased reliability and improved operability. The second, or bigger payload, missile development program would take advantage of sizable increases in specific impulse of liquid propellants of different composition than the LOX-RP now used. This second type missile can result from a product improvement program on the first generation ballistic missile of the I.O.C.

In addition to providing improved military weapons, product improvements of the first generation ICBM's will provide boosters for launching satellites, which can be expected to have long-range usefulness to the Air Force. The smaller, improved ICBM's might well take over the major task of providing the inevitability of retaliation so essential as the major large war deterrent.

Improved ICBM's cannot be possible without a substantial program of advanced research and development to carry the propulsion, guidance, nose cone, and structural aspects of the missile system design into the better performance ranges which are seen to be technically feasible. Accordingly, the second generation of ICBM's must follow the first generation by some years. It is recommended that every effort be made to cut down the time required to take the next step. More specifically, the Committee recommends that the Air Force provide for these future second generation weapons systems by early, rather than late, preliminary research and development. To start a crash program some years later, with the subsystem research and development having to parallel an overlapping weapon system development and initial production, will be much more costly in time and resources and will represent a substantial risk to the nation.

b. Military Satellites

Military satellites for reconnaissance and intelligence missions appear to the Committee to deserve the next priority amongst military weapons systems in the cis-lunar region. The potential capability on the part of an enemy nation of launching first and (even worse) second generation ICBM's against us, and the increasing need for knowledge of targets as well as enemy operations appear to require a virtual continual surveillance of the enemy nation. The military satellite offers a means for doing this technically in a way that has different political implications from any alternative reconnaissance approach. Although there is no guarantee that political pressure will not interfere with our maintaining such satellites in passage over any enemy country, the need is so great and the possibility of world opinion sanctioning such space operations is considered so good that the nation cannot afford to be without such a military system at the earliest practical date. In this connection, it is to be noted that, while the ICBM program automatically provides the bulk of the research and development that assures the boosting of such reconnaissance and intelligence payloads into an orbit, it is necessary to insure that such other subsystems and devices as are needed to complete the full reconnaissance intelligence systems are under simultaneous substantial development. These subsystems and devices include sensing devices, data transmittal systems and satellite-borne power supplies.

There are other military weapons systems or military systems based on the use of satellites that appear to have sound technical possibilities, but the background work on them is not yet sufficient to justify the starting of the complete system development. These include satellite systems for improved world-wide communications and for weather prediction. Here, the Committee recommends a relatively lower priority systems study with an amount of accompanying technique and experimental exploration wherever there is a lack of a critical subsystem or data for sound systems analysis.

c. Other Military Vehicles

The Committee considered three other types of vehicles with potential military capabilities and agreed that some work should be done on all. These are the boost-glide system, the pseudo-satellite or satelloid, the manned, winged research vehicles such as the X-15 and X-15 follow-on.

The Committee considered boost-glide systems for bombing and reconnaissance purposes. Considering first versions of such weapons systems that do not include human operators or passengers, the Committee recognizes that the use of a boost-glide trajectory, as compared with a more nearly true ballistic trajectory, may in the end offer certain advantages. The problem is one of correctly assessing the possibilities of a smaller take-off weight against what might be greater complexity in guidance, greater vulnerability, and clearly more severe structural and heating problems. The trade-offs may be very much a function of range and size of payload. Until there are more realistic evaluations of the pros and cons here, the Committee does not feel that any substantial systems development is indicated, but it does recommend continued paper studies on such systems and limited component research and development.

Somewhat related to the boost-glide principle are suggestions of pseudo-satellites or satelloids in which one or more passes around the earth might be made and in which the altitude, speed, earth curvature, lift, drag, and gravity effects so combine that the trajectory for the most practical purposes can be viewed as that of an earth satellite at a lower altitude, say 50 to 80 miles. Here, again, any substantial military system or component development is out of order until there is further evaluation on a paper study basis.

The Committee gave special attention to the problem of human passengers in vehicles that are intended for bombing, reconnaissance, or any purpose that takes them to extraordinary altitudes or into satellite or nearly ballistic trajectories for long-range and related environmental situations. The Committee was not readily able to see impressive instances in which the addition of a man could clearly provide some function better or more easily than potential electromechanical equipment. As we enter the range of velocities and altitudes that must be considered here, the possible contributions of the human operator shrink rapidly. On the other hand, the requirements to make possible his survival rise enormously. The provision for take-off and landing, the need for providing a suitable environment for the human operator in flight, and the provision of high reliability for safety sake, complicate the trajectory and the controls, add to the over-all weight by an order of magnitude or more, and add greatly to the cost and time of development, especially in the early stages of development. Accordingly, the Committee can see no justification for the starting of major weapons systems in the area covered by the Committee in which the system is designed around the inclusion of a human passenger.

At the same time it recommends against inclusion of the man in these weapon systems, the Committee recognizes the desirability of understanding better man's relationship to his environment as speeds, altitudes, and accelerations increase, and as additional environmental factors, such as radiation, become of greater importance. Accordingly, it recommends the continuation of such programs as the X-15, understanding these to be programs for the collection of important data rather than prototypes for future manned weapon systems. The value of the X-15 follow-on system must be considered very seriously before it proceeds beyond the paper study stage.

d. Anti-Ballistic Missiles

The anti-ballistic missile system presented to the Committee the most severe problem of evaluation and categorizing. On the one hand, it is recognized that this problem is sufficiently difficult and has enough new elements in it that the Committee would like to see more systems study and analysis and more experimental work on critical sub-system items, such as early warning and acquisition radar, before the Air Force launches into a full-scale military weapons systems development. On the other hand, it recognizes the urgency of the need for starting an anti-ICBM area defense system, especially in view of the second generation ICBM possibilities. A compromise would appear to be in order here, with the beginning, on a strictly controlled basis, of an anti-ICBM weapon system development while assuring that ample attention is given to the systems studies and the experimental foundations.

e. Nuclear Weapons Technology

Related to the above, but having broader implications as well, are two other questions. One has to do with weapons effects, and the other has to do more generally with the relationship of all of the weapons systems to advanced warhead possibilities. The Committee feels that the Air Force should press more strongly for an appropriate program that will bring forth better biological and physical data on the effects of nuclear warheads detonated at all heights but particularly at the higher altitudes and of the vulnerability of warheads and other equipment

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to the effects of nearby detonations at extremely high altitudes.

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Attention is also called to the fact that the Committee based its thinking upon nuclear warheads and did not consider chemical or biological warheads. To the extent that the Committee was informed on these matters, it is felt that all of the recommendations in the preliminary report hold for all these classes of warheads.

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2. Other Potential Military Uses of Space Technology

The Committee recognized that there have been numerous suggestions for new projects based upon vehicles in space well beyond the earth's atmosphere. From all presentations made to the Committee, and from its own deliberations, the Committee was not able to see any military application resulting from occupation of the moon for reconnaissance, communications, or strategic bombing purposes, or for the creation of space stations for bombing, satellites for active ICBM defense, satellites of the moon, or space ships to other planets. This is not to say that there are not technically feasible ideas involving the use of the moon or man-made space devices to participate in these military objectives. It is simply that in every instance it was believed that better approaches exist for meeting the military requirements with "global" systems. The Committee even considered such suggestions as the acquisition of the moon for the purpose of natural resources, but considered this exceedingly weak.

Nevertheless, the Committee realized that on a long-range basis the Air Force cannot afford to overlook the possibility that potential uses not now apparent may be discernible in future years. Accordingly, appropriate steps should be taken to insure at least that certain advanced technological fields are not overlooked that might later prove important in space conquest.

Another entirely separate reason for recommending that the Air Force have a certain minimum program in this field is the psychological warfare aspects represented by the effect on the nations of the earth if an enemy nation becomes superior in space technology, i.e., "captures the moon," and in other ways based on space technology progress creates the impression of technical, and hence military, superiority in the minds of other nations. Here it must be recognized that technical superiority and military superiority have in many ways become synonymous in the public mind of the world in general.

The Committee, for the above reasons, recommends Air Force research programs in a number of areas, and has selected these not only upon the basis of their potential use in general space technology, but because these techniques have broad possibilities and hence other substantial justifications as well. Thus, such items as magneto-hydrodynamics, with its possibilities for major advances in the aerodynamics and propulsion arts, and nuclear propulsion should both be studied. In these instances, it is not timely to consider any specific military tasks based on these techniques, but because of the break-through possibilities it is important that experimental work as well as theoretical studies continue at not too meager a pace. Similarly, electrical (ion) propulsion and work on solar batteries, on nuclear auxiliary power systems, and in shielding research should receive attention.

3. Scientific Research and Exploration of Space

Distinct from the research and development in improved techniques for advancing the general aeronautical or electrical art enumerated above, there remains the question of exploration of outer space, and the acquisition of scientific data as to what goes on in outer space. Here, for example, we do not seek to develop magnetohydrodynamic forces with the idea of applying them to propulsion and other applications. Instead, we merely ask the question of what is true about the universe in a region where man has not previously been able to make direct observations.

It is the Committee's belief that the Air Force has a mission to perform in this pure research area. In this area, Air Force laboratories and contractors have already made substantial contributions.

One reason for the Air Force's continued participation is that, as a service highly dependent upon new scientific developments, the policy has already been recognized that it should make a contribution to pure research that does not directly tie to a military application. It must be anticipated, in other words, that the superior knowledge of nature that will result from observations in space will have repercussions on our ability to apply science generally to the military problems. For example, basic radiation is an important item in the list of scientific phenomena applied widely by the military, and observations on radiation in outer space could be expected to accelerate our understanding of fundamental laws of energy release and transmission.

However, there is another reason for Air Force interest in exploration of space that is somewhat more special to the Air Force as a service than to other government agencies. This is that the Air Force is the service with proper cognizance over military weapons systems that provide means for carrying instruments out into space. The Air Force is the logical service to supply much of the physical requirements for such a research program. Just as the Navy is the logistics branch of the government to bring the bulk of the scientific data back from the Antarctic, so the Air Force is the logical military service to be assigned the job of logistics for space data collection. In particular, it is to be noted that the ICBM provides a platform with launching and ground handling equipment that makes possible outer space scientific data collection with a minimum extension from the purely military programs. No other government group is in a similar position.

4. Organization

The Committee recognizes that in a number of respects the Air Force is not yet organized to make possible the most efficient handling of its future role in the fields discussed above, and as a result certain specific recommendations are made with regard to organization.

Ballistic missile programs of the Air Force, and programs very closely related to them and using common apperatus and facilities, including military satellites, should continue to be managed by the Air Force Ballistic Missile Division, ARDC. While this appears to be the plan of ARDC, and while every action taken on these projects to date confirms this, the Committee was concerned to note that there is not yet an official understanding that AFBMD is a permanent organization set up to cover this role into the future. Accordingly, explorations and decisions on future possibilities in the ballistic missile and satellite area cannot proceed with the maximum effectiveness. The Committee urges that AFBMD be recognized at the earliest possible date as a permanent organization for ballistic missiles and satellite projects.

As to other military weapons systems developments systems studies, and subsystem experimentation intended as a preliminary to, or as a back-up of, such advanced military systems, the Committee believes that the present ARDC organization provides the necessary management centers and means of control of communication. No special organizational rearrangement is indicated for these purposes alone. (The Committee is aware that for a number of reasons ARDC, in common with other large complexes continually meeting new problems, has organizational problems, and that organizational changes reflecting the solution of these problems no doubt will be made. It is endeavoring here to single out for special mention only those aspects within the province of the Committee.)

Special organizational patterns must be created for the pure research projects indicated above. Here the Committee suggests that the Air Force should seek to set up at high ARDC level a committee which combines appropriate representation from the Air Force and from the scientific body of the nation at large. The mission of this Committee is to advise the Air Force on the selection of the most important scientific experiments which will be carried out in this program to make available Air Force aid to scientific researchers, and to disseminate to scientists knowledge of our research service and ability in these fields. This committee should be chairmanned by a high-level ARDC officer, and its specific members should include representatives from scientific bodies outside of the Air Force (such as the National Academy of Science), the Scientific Advisory Board, ARDC Centers that will be concerned with space technology research, and the operating agencies with ARDC that are likely to be chosen for the executive control of individual projects. In setting up this committee, it should be recognized that it is advisory only, and that the chairman will be expected to exercise the Air Force responsibility, making whatever use ARDC's judgment dictates is proper of the advice rendered by the committee. When a specific project is to be carried out, ARDC should select one or another of its Centers or other management agencies for the program execution. Specifically, however, it is recommended that whenever scientific data collection depends heavily upon the use of ballistic missiles or important parts thereof, both as to airborne or ground apparatus, or, similarly, parts of military satellite systems, or otherwise has a relationship to the scheduling and launching of projects of AFBMD, AFBMD be made the executive agency for the execution of the scientific program.

The Committee had the benefit of a briefing covering essentially the material contained in RAND Report S-53: "Space Flight and the Air Force" by R. W. Buchheim. This excellent and highly "sensible" report discusses at some length the possible military and scientific justifications for an Air Force Space Flight program, and outlines a fairly specific scientific program which could reasonably be undertaken in the near future. The Committee's recommendations, although much less specific, are not inconsistent with the conclusions of the RAND Report.

The ARDC contractors who presented briefings to the Committee were seriously handicapped because of the short time allotted for the presentation of their thoughts. Still, they did an excellent job in presenting their most interesting ideas.

The Committee would like to thank the Secretary, Chester Hasert, for the difficult arrangements for such a concise program.

AD HOC COMMITTEE ON ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT:

Dr. H. Guyford Stever, Chairman
Mr. Chester N. Hasert, Secretary
Prof. Joseph Kaplan
Dr. Clark B. Millikan
Dr. Mark M. Mills
Prof. W. H. Radford
Dr. Simon Ramo
Dr. Clayton S. White

APPENDIX II

MEMBERSHIP OF THE SCIENTIFIC ADVISORY BOARD AD HOC COMMITTEE
ON
ADVANCED WEAPONS TECHNOLOGY AND ENVIRONMENT

Dr. H. Guyford Stever, Chairman
Professor Joseph Kaplan
Dr. Clark B. Millikan
Dr. Mark M. Mills
Professor W. H. Radford
Dr. Simon Ramo
Dr. Clayton S. White
Mr. Chester N. Hasert, Secretary

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APPENDIX I

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

15 May 1957

MEMORANDUM FOR CHAIRMAN, SCIENTIFIC ADVISORY BOARD

SUBJECT: SAB Special Study of Advanced Weapon Technology and Environment

1. Reference is made to your memo of February 20, 1957, transmitting the report of the Fuels and Propulsion Panel, which suggested special studies, on a broad basis, of the problems of national defense in cis-lunar space.

2. In accordance with your suggestion, I would like the SAB to establish such a special study group, to review these problems with particular regard to their impact on future weapon technology and the operating environment in which they may function.

3. The present trend of technology in ballistic vehicle development seems to indicate an early capability of rocket type vehicles to reach new regions of cis-lunar space. This suggests the possibilities of military operations in completely new environments. The attendant technological problems of vehicle design, propulsion, weapons effects, communications, human factors, strategy and tactics, and many others, need careful investigation. The severe impact on military operations makes it imperative that the Air Force keep abreast of the latest thinking in these areas and to be immediately informed of potential breakthroughs.

4. Studies are presently underway at the Ramo-Wooldridge Corporation, in conjunction with WDD and Hq USAF. It is suggested that the SAB committee review the work of these groups (which should be available in August) as well as studies at the RAND Corporation and industry groups which are considering these problems.

5. It is requested that this committee advise the Air Force with regard to the status of present technological knowledge in this field, and the recommended direction of future programs, for both supporting research to explore this new environment and the study of future weapon systems.

(signed)

D. L. PUTT
Lt. General, USAF
Deputy Chief of Staff, Development

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

APPENDIX III

24 July 1957

SAB SPECIAL STUDY OF ADVANCED WEAPONS TECHNOLOGY & ENVIRONMENT
29-31 JULY 1957
THE RAND CORPORATION, SANTA MONICA, CALIFORNIA

AGENDA

MONDAY - 29 July 1957

0900 - Executive Session
0925 - Introduction - Dr. H. Guyford Stever
0930 - Directorate of Development Planning, DCS/Development, Hq USAF
(Lt Col Ryan)

ARDC BRIEFING

0945-1000 - ARDC Keynote Speech - Brig Gen Marvin C. Demler, Dep Cmdr,
R&D, Hq ARDC

1000-1025 - Selected Systems Studies - Col. Augustus Prentiss, Jr.,
Director of Systems Plans
Dep Cmdr, Weapon Sys, Hq ARDC
5 min Discussion

1030-1040 - BREAK

1040-1055 - Contributions of the AFBMD Program to Future Weapons -
Col. Frederick Oder, Director of System 117-L - AFBMD
5 min Discussion

1100-1130 - Propulsion, Secondary Power, and Vehicle Design
Mr. Ezra Kotcher, Tech Dir, Dir of Labs, WADC
5 min Discussion

1135-1155 - Guidance and Control - Mr. James Burke, Tech Adv, Dir of
Air Weapons, Dep Cmdr, R&D, Hq ARDC
5 min Discussion

1200-1300 - LUNCH

1300-1310 - Communications, Major Edward Wright, Chf Comm Div, Comm &
Elec Dir, Dep Cmdr, R&D, Hq ARDC
5 min Discussion

1315- 1335 - Human Factors - Brig Gen Donald Flickinger, Dir of Human
Factors, Dep Cmdr, R&D, Hq ARDC
10 min Discussion

1345-1415 – Geophysics – Dr. Murray Zelikoff, Chf of Photo-Chem Lab, Geophysics Res Dir, AFCRC

5 min Discussion

1420-1445 – Research Trends – Dr. Morton Alperin, Dir of Office for Advanced Studies, AFOSR

5 min Discussion

1450-1515 – Summary Discussion of the ARDC Presentation

TUESDAY – 30 July 1957

0900 – Executive Session

0915 – RAND Presentation (R. Buchheim)

1115 – Break

Each of the following presentations are closed to industry representatives other than the company making the presentation:

1130 – Aeronutronics Systems, Inc. (E. Krause)

1200 – LUNCH

1300 – Aerophysics Development Corp. (W. Bollay)
1330 – Boeing Aircraft Co. (H. Longfelder)
1400 – Bell Aircraft Co. (W. Dornberger)

1430 – BREAK

1500 – Convair Astronautics Division (H. Friedrich)
1530 – Douglas Aircraft Company (E. Wheaton)
1600 – Lockheed Missiles Systems Div. (L. Ridenour)
1630 – Martin Company (G. Trimble)
1700 – North American (R. Wilson)
1730 – Adjourn

WEDNESDAY – 31 July 1957

Executive Session

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

Scientific Advisory Board to the Chief of Staff

APPENDIX IV

DISTRIBUTION OF THE SCIENTIFIC ADVISORY BOARD REPORT OF THE AD HOC COMMITTEE ON ADVANCED WEAPONS TECHNOLOGY & ENVIRONMENT

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Scientific Advisory Board Chairman	AFCSA	4
Asst Chief of Staff for Guided Missiles	AFCGM	5
Deputy Chief of Staff, Development	AFDDC	6
Director of Research & Development	AFDRD	7
Air Defense Group	AFDRD-AD	8
Aeronautics Division	AFDRD-AN	9
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Deputy Chief of Staff, Personnel	AFPDC	25

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Commander		59,60

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AF SPECIAL WEAPONS CENTER

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via USAF Liaison Office		106
The Rand Corp.		107,108
1700 Main St.)		

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Captain David Bradburn

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OCT 57

/s/ Charles H. Terhune, Jr.

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

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MEMORANDUM FOR GENERAL LEMAY

10 October 1957

SUBJECT: WS 117L

I have approved the program recommended by the Air Council as a planning objective with the understanding that I will have the opportunity to again review the program in the amount of funds required in FY 58 based on the funds proposed and that Mr. Quarles, D. S. D. will also have the opportunity to review the program. This will probably have to go to the President.

/s/ JAMES DOUGLAS
Secretary of the Air Force

C [redacted]

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~~CONFIDENTIAL~~

15 Oct 57

NFW002
PP INGL 7466
DE RJWPNF 18F
P 151410Z
FM CHIEF OF STAFF USAF WASH DC
TO COMDR AFBMD ARDC INGLEWOOD CALIF
BT

SECRET CITE AFDRD-SS 51476. THIS IS CATEGORY AC MESSAGE. REF WDTR-10-8-E DTD 10 OCT 57. PROCUREMENT AUTHORIZATION 58-95 ARS WS 117L, CONTROL SYMBOL 58-131-15 IN THE AMOUNT OF 35.1 MILLION DOLLARS P-100 FUNDS WAS ESTABLISHED ON 11 OCT 57 AND TRANSMITTED TO COMDR AMC, ATTN CLN MCFP. P-200 FUNDS NOT YET AVAILABLE AND WILL BE RELEASED AS EARLY AS PRACTICAL

BT
15/1730Z OCT RJWPNF

WDSSAT 57-697

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INTERVALS: NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

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17 October 1957

Lt. Gen. S. E. Anderson
Commander
Air Research & Development Command
P.O. Box 1395
Baltimore 3, Maryland

Dear Sam,

As you would expect, the Russian launching of an earth satellite has caused considerable alarm not only in the Air Force but also in the Department of Defense. Just yesterday, 16 October, we briefed the Deputy Secretary of Defense, Mr. Quarles, on the advanced reconnaissance system, weapon system 117L. Unfortunately, Mr. Quarles still seemed to be rather cold on our planned program. In addition, at this meeting were Mr. Douglas, the Secretary of the Air Force, General LeMay, Assistant Secretary of Defense, R&E, Dr. Foote, and Assistant Secretary of the Air Force, Mr. Horner, and a number of other representatives from the Office of the Secretary of Defense and Office, Secretary of the Air Force.

Subsequent to the meeting General LeMay and I met with Mr. Douglas, and it is Mr. Douglas' desire that the Air Force look into all possible schemes that might permit the Air Force to do something spectacular in the satellite field. We discussed such things as the possibility of putting a larger satellite on orbit, or even such schemes as putting a satellite on a moon orbit, and perhaps shooting a satellite to the moon either with instrumentation or perhaps with a small bang, nuclear weapon. The possibility of putting a small satellite with instrumentation on the moon. In fact, this has just recently been studied by RAND. The conclusions of their study are reported in RAND Report No. R-307.

I believe that it would be advantageous for us to look at this problem in two respects: (1) On a basis of no interruption of the ICBM-IRBM programs. This would limit us to using such hardware as the NAVAHO boosters, the X-17 vehicle, etc. The other aspect would be using whatever we have including the ICBM-IRBM hardware.

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Ltr to Gen Anderson fr Gen Putt

The timing of such a scheme could be most critical since there have been reports that the Russians may announce some new development around the 7th of November celebrating the 50th Anniversary of the Soviet Revolution. I realize that this date is close at hand and we certainly cannot put anything in the air by this date, but perhaps we may have some announcement that we might make. The other critical date and certainly more critical from a U.S. prestige viewpoint is March 1958 when the U.S. is to launch its own scientific satellite on VANGUARD. I am sure that you have been kept abreast of the VANGUARD Program and realize that it is marginal at best so that you may be thinking of these schemes that Mr. Douglas would like investigated as perhaps a backup should the VANGUARD fail or should not produce the desired world reaction.

I realize that looking into some of these schemes may be rather difficult. I think it would be advantageous to call in industry to assist us. We have just recently heard that North American Aviation is preparing a program for using the NAVAHO-X17 combination. I think it would be wise to discuss this with others as well as North American.

Please let me know as soon as possible schemes that the Air Force might submit to any DOD pressure or Executive pressure for us to propose a spectacular event in the near future. I would also appreciate names of individuals whom you have designated in ARDC to monitor this effort. I have assigned this particular effort to my Assistant for Special Projects, Col Ralph J. Nunziato, in order that they may work together.

D. L. PUTT
Lieutenant General, USAF
Deputy Chief of Staff, Development

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RECEIVED
WDD ARDC
19 OCT 1957

NFW002
PP RJWPNF
DE RJWPNF 6F
P 1820257
FM COFS USAF WASH DC
TO ZEN/COMAMC WPAFB OHIO
INFO RJWPNF/COMAFBMD ARDC INGLEWOOD CALIF
BT
/~~CONFIDE~~NTIAL/FROM AFMPP CITE 51689. COMAMC FOR MCFPPD
REFERENCE PA 58-95 /ARS WS 117L/. YOU ARE HEREBY DIRECTED TO LIMIT
OBLIGATIONS AND COMMITMENTS ON REF PA58-95 to $15.5 MILLION THRU
JAN 1958. THE BALANCE OF FUNDS ON REF PA 58-95 WILL BE HELD IN
ABEYANCE PENDING REVIEW OF PROGRAM BY HIGHER AUTHORITY. THIS LIMITATION
IS NOT REPEAT IS NOT INTENDED TO REDUCE PLANNED RATE OF EFFORT THRU
JAN 1958.
BT
19/0037Z OCT RJWPNF

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DECLASSIFIED. DOD DIR 5200.10

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WS 117L Acceleration

WDTO

WDTR

25 Oct 57

1. Reference 1 a: Hq USAF Telecon 8 Oct 57
1 b: AFBMD TWX of 9 Oct 57
1 c: Briefing of Soper Team

Paragraphs WS 117L:

Further analysis of the effort proposed by reference 1 a and as answered by references 1 b and 1 c as well as discussions with members of Colonel Soper's team reveals no change in the requirements for acceleration of the WS 117L program. It should be noted that the fund requirements cited in reference 1 b for WS 117L are total fund requirements of $99.2 million in FY 1958 and $121.7 million in FY 1959. As presented to members of Colonel Soper's team the principal effects of such funding would be to:

a. Make possible first orbit flight of the WS 117L vehicle in the second quarter of Calendar Year 1959 rather than at the end of that year.

b. Advance the availability of the visual subsystem by approximately six months.

c. Advance the availability of the ferret subsystem by nine to twelve months.

d. Provide earlier construction of the earliest need facilities.

e. Provide earlier procurement of the SM 65 missiles used as boosters for the WS 117L.

2. Inasmuch as WS 117L is not as far along as are the other major weapon systems covered in this letter further definition as to acceleration cannot be reliably estimated at this time.

SIGNED

FREDERIC C. E. ODER
Colonel, USAF
Director WS 117L

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Mg 2-9/183

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MEMORANDUM FOR THE RECORD OCT 25 1957

SUBJECT: Briefing of Deputy Secretary of Defense, Mr. Quarles on WS 117L (ARS) on 16 October 1957

1. The purpose of this memorandum is to record the gist of the actions occurring during and after the subject briefing. In addition to Mr. Quarles those present (this is to the best of my knowledge since I wasn't introduced to them all) were:

Mr. James Douglas, Secy. of the Air Force
Gen. Curtis E. LeMay, VC of S, USAF
Dr. Foote, ASD (R&E)
Mr. W. H. Francis, ASD (M, R&R)
Lt. Gen. D. L. Putt, DCS/D, USAF
Mr. R. E. Horner, ASAF (R&D)
Mr. J. B. Macauley Dep ASD (R&E)
Dr. H. R. Skifter Spec. Asst. to ASD (R&E)
Dr. Townsend, OASD (R&E)
Brig. Gen. O. J. Ritland, AFBMD (ARDC)
Col. B. H. Harris, Jr. OASAF (R&D)
Col. E. A. Kiessling, Asst for GM, Hq ARDC
Col. R. J. Nunziato, Asst for Spec. Proj. DCS/D, USAF
Col. F. C. E. Oder, AFBMD (ARDC)

2. In his introduction to the briefing by the undersigned, General Putt reviewed the history of WS 117L from 1945 to the present, the recommendations of the Air Council as of approximately 16 September 1957, the fact that the program under consideration was developed prior to the recent Soviet launching of an earth satellite ("Sputnik") and that the basic purpose that WS 117L was to provide a reconnaissance capability. This latter point was emphasized by General LeMay who stated that during its deliberations the Air Council reviewed all proposed reconnaissance systems planned for the period subsequent to 1962 and had unanimously agreed that WS 117L should be given maximum effort and other less promising approaches had been terminated.

3. The undersigned covered the following points: current technical status of the program, possible future military applications of satellite vehicles (included by direction of Hq USAF in par 1 of their Secret TWX cite AFDDC-SP 51419, date-time 112141Z October) and the details of the program envisaged for FYs 1958 and 1957. Mr. Quarles raised several specific questions during the briefing which were answered to Mr. Quarles' apparent satisfaction. Mr. Quarles took very strong and specific exception to the inclusion in the presentation of any thoughts on the use of a satellite as a (nuclear) weapons carrier and stated that the Air Force was out of line in advancing this as a possible application of the satellite. He verbally directed that any such applications not be considered further in Air Force planning. Although both General LeMay and General Putt voiced objection to this direction on the grounds that we had no assurances that the USSR would not explore this potential of satellites and could be expected to do so, Mr. Quarles remained adamant.

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4. In the discussion following the prepared presentation, Mr. Quarles stated that for cold war purposes (i.e., "counter-Sputnik") one should consider a less sophisticated approach (than WS 117L) and that one should not attach much cold war significance to this program. Based upon the view that the program presented was "pre-Sputnik" and was for reconnaissance purposes both Mr. Douglas and General LeMay concurred in this view. Mr. Quarles' expressed views appeared to be somewhat contradictory since on one hand he stated that "this program (ARS) ought to be kept in a planning atmosphere" while on the other he stated that "I agree that there should be an aggressive Air Force project on a reconnaissance satellite". Mr. Douglas and General LeMay again pointed out forcefully that the need for reconnaissance was strong and that the Air Council had carefully considered all reconnaissance programs either proposed or under development for the time period concerned and on the basis of this analysis had recommended that the ARS go ahead as fast as possible, consistent with good management and that other less promising approaches to this critical problem (reconnaissance) had been terminated. Mr. Quarles then said that there were a number of uncertainties in the program (ARS) and that he felt that the Air Force developers were taking an over-optimistic view of the problems involved. To this General Putt pointed out the careful reviews and wholehearted endorsements of the technical aspects of the program by the President's Science Advisory Committee in 1956 and 1957, as well as, continuing review by the Air Force Scientific Advisory Board whose most recent recommendation in the late summer of 1957 was that ARS should be given a priority, second only to the ICBM. General Putt also pointed out that the ARS was under the management of the Air Force Ballistic Missile Division which had an excellent reputation for effective and efficient management. Mr. Quarles then questioned the rate for which funds were proposed for the ARS program and after this was again reviewed in detail he still appeared to resist the level of effort considered essential by the Air Council. Mr. Horner pointed out to him that the next best reconnaissance program (to ARS) which was considered (which is a highly classified program) would cost over three times as much and had even more difficult problems (and less long term utility) associated with it.

5. The meeting was terminated without resolution of the matter at hand. The suggestion was made that Secretary McElroy be briefed on ARS.

6. As a result of a subsequent meeting between Secretary Douglas, General LeMay and General Putt, the undersigned was advised (during a meeting with General Putt, Col. Kiessling, Col. Nunziato and the undersigned) that:

a. This (the reconnaissance satellite) is a national problem and an Air Force budget problem. Mr. Douglas could not take a final position on the program presented but hoped to have this resolved within two weeks. General Putt was of the opinion that this resolution might require as much as two months.

b. Secretary Douglas was certainly ammenable to the view that this (the Air Council recommended effort) was a minimum program.

c. AFBMD was asked to determine the funds needed to keep the present contract in force at a better rate than the present rate (this action was taken by a telephone conversation between Col. Nunziato AFDDC-SP and representatives of the AFBMD project office on 18 October 1957. A memorandum For

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Record, dated 18 October 1957, Subject, "Telecon between Col. Nunziato, Col. Oder, Lt. Col. Seay, and Major Zelenka", covers this agreement which was confirmed by Hq USAF Confidential TWX cite AFMPP51689 date-time 18205Z October 1957).

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d. Factors concerning the possible briefing to Secretary McElroy were discussed but no time, date, nor location was established.

e. Hq ARDC was to establish a group to look at all possible schemes the Air Force could come up with for a counter to Sputnik which might be both unique and quickly done. Col. Kiessling took this as an action item with a 1 November 57 deadline.

f. DCS/D was to prepare a brief statement to review the entire reconnaissance program.

g. AFBMD was to assemble a study which would highlight in more detail the as yet unresolved problems on the ARS, to indicate their nature and schedule for solution including test dates, e.g. the data link, when can we expect to demonstrate the data link, etc. The WS 117L Project Office will assemble this data together with Lockheed Missile Systems Division. No specific deadline was given.

FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

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... FORCE BALLISTIC MISSILE DIVIS.
~~WESTERN DEVELOPMENT DIVISION~~
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 262
Inglewood, California

IN REPLY ADDRESS COMMUNICATION TO COMDR, WDD, ATTENTION FOLLOWING OFFICE SYMBOL

WDTL

31 October 1957

MEMORANDUM FOR GENERAL RITLAND AND COLONEL TERHUNE

SUBJECT: Trip Report

1. This will report on my attendance at the 8th International Astronautical Congress, Barcelona, Spain, 6-12 October and my visit to the European Office of ARDC on 15 and 16 October, 1957.

2. This Congress was the 8th annual meeting of the International Astronautical Federation (IAF). All meetings have been held in Europe, previous locations being Paris, London, Stuttgart, Zurich, Innsbruck, Copenhagen, and Rome. The next Congress is scheduled to be held in Poland. Twenty-five organizations from twenty-one different countries are now members of the IAF. The total membership of these organizations exceeds 11,000. The general aims and objectives of the IAF are as follows:

"a. The IAF shall exist to promote and stimulate the achievement of space flight as a peaceful project.

b. The IAF shall do all in its power to secure the widespread dissemination of technical and other information on space flight through the medium of exchange of publications, collaboration on research, etc. as between its members.

c. The IAF shall do all in its power to stimulate public interest in an support for the idea of space flight through the medium of books, press, lectures, radio, film, etc.

d. The IAF shall do all in its power to stimulate work on astronautical subjects by international and national research and development establishments, universities, commercial firms, individual specialists, etc."

3. The published program of the technical sessions is attached. Some substitutions were made and some papers were omitted completely. Of the 44 scheduled, 23 were U.S., the remaining 21 were from ten countries, 5 being from the USSR. Copies were obtained of all the papers that were available and the list of these is attached. These papers are on file in WDTL for the use of anyone interested. Most of the papers are in English. Abstracts of the three Russian papers on Satellites are available in English and the abstract on the Russian paper on "Some Problems Relating to Dynamics of the Flight to the Moon" is available

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in English, but the complete papers are not available. The complete paper on "Investigation of Cosmic Radiation by Means of an Artificial Earth Satellite" is available in Russian but no translation is presently available. One copy of the paper "The Nature of Cosmic Radio Emission and the Origin of Cosmic Rays" by V. L. Ginsberg, Academy of Sciencies of USSR, Moscow, is available. This latter paper however, was not given.

4. For a normal technical session the papers in general would have been considered very good. However, due to the launching of "Sputnik" two days before the opening of the Congress, most of the papers seemed to me to fall pretty flat. Nearly all of them were on theoretical work with some getting very lightly into experimental work but none, with the exception of four of the Russian papers and the papers by Major Simons and Otto Winzen covering the "Manhigh" project dealt with development work. There was an extremely good turnout for these two U.S. papers which were well illustrated with slides and movies and the presentations precipitated considerable discussion. The session at which these papers were given was the only one where the attendance exceeded the seating capacity. Another reason for the good attendance may have been the fact that other films were shown at this time. One Rocket Engine Test Station film was shown on rocket firings and the Disney film, "Man in Space" was shown.

5. Among Army personnel present were Generals Toftoy and Barclay. General Toftoy gave a resume' of the Army Missile Program covering Honest John, Little John, LaCrosse, Hawk, Corporel, Nike-Ajax, Nike-Hercules, and Redstone. This talk seemed a little out of place sandwiched as it was between more technical papers. He did mention Bumper-Wac and that 80 V-2s had been instrumented to obtain scientific data. He also mentioned some results of radar tests aimed at the moon and the satellite capability that the Army had. This was an added paper apparently inserted in an attempt to counteract some of the Russian publicity. To me it fell far short of doing this. I think that it must have been apparent to everyone that not only were the three U.S. military services not together on an approach to the satellite and space vehicle problems but the entire U.S. effort was completely uncoordinated. Although much more work is apparently going on in the U.S. in this area than in any other country including the USSR, it is being done pretty much on an individual basis with no one tying all the bits and pieces together and directing the effort. Many companies, universities and government organizations have tackled portions of the problem in which they are interested. The Russian satellite papers in contrast were on development work that they are doing or have done. This was proven by their launching of Sputnik. By analogy I would assume that they also have an active project on a lunar vehicle, inasmuch as one of their papers was devoted to this subject.

6. The Russians exploited fully every opportunity to create a good impression. At the beginning of Madame Masevich's talk she made a point of stating that although the paper was entitled "Preparation for Visual Observation of Artificial Earth Satellites" that it was obvious by now that the preparations had been completed successfully and were an accomplished fact. At the end of her talk she donated a model of their tracking telescope to the Spanish Astronautical Society with the "hopes of cooperation in the establishment of observation stations in Spain". Even their announcement that two of their papers on the Satellite could not be given because the authors were not present was done in a rather dramatic fashion, implying that they were at home actively involved in their project.

7. Some additional information obtained from Leonidas Sedov during discussions outside the Technical sessions will be of interest. In response to a question as to how much of the satellite effort had been Russian and how much they had depended upon Germans, he answered in the following fashion: "that anyone could have done this ten years ago if they had followed up on German engine development. He stated that all one had to do was use two A-10 engines for the first stage booster, the V-2 engine for the second stage and a Wasserfall engine for the third stage and one would be able to get a satellite into orbit!" There are several versions of the A-10 engine development but he did not indicate any thrust. Whether or not they actually used these German designed engines or modifications of them I do not know but that was certainly implied. It was also implied that they used radio guidance as there was no jamming problem, this being a peaceful vehicle. He also stated that this was definitely timed to the Congress date and this was the first firing that they had attempted. It had originally been scheduled for 17 September but that it had slipped to 4 October for reasons not stated. He did state that they had a second satellite vehicle available as a backup that they would have used had the first one been unsuccessful. Someone questioned him about how they could have so much confidence in their first one being successful and he answered by saying that their people figured every thing out very carefully theoretically and considered all factors. When asked about the extent of their computer effort in connection with a project of this nature he said that they had every thing in their heads. Don't know exactly what he meant by that as it is known that they have extensive computing facilities.

8. During the talk on Preparation for Visual Observation of Artificial Earth Satellites Madame Masevich stated that their preparations started only last spring. She didn't make it clear whether these preparations included only the selection and training of the observing teams or whether it also included the development of their telescope. Their telescope is 6 power with 11 degree field of vision which she emphasized could be used for other astronautical work as well as tracking satellites. She stated that they expected to determine the position of their satellite to within .5 degree and the time to within .5 seconds at present. They expect the accuracy to improve considerably later.

Sixty-eight observing teams were established at 34 observatories and universities. About 30 observers are assigned to each team. They found that trained amateurs were working out very well, probably better than professional astronomers who were trained on automatic equipment. The leader of each team is, however, a recognized astronomer but the majority of the observing team working under him is composed of mature students. The teams are equipped with telescopes, tape recorders, radio, telegraph and stopwatches. The ephemeris is communicated by the Astronomical Council in charge of all observations to the stations in advance. During the observations, precise time signals are broadcast or telephoned to the stations. The observers send the signal by pressing a telegraph key as the satellite crosses the telescope reticles or passes a certain stellar configuration in the field. Both time and passage signals are registered on the tape recorder, the exact moment of the passage is determined later by a stopwatch and the position read from the stellar chart. It was stated that the stations situated in the zone of vision of the American satellite could also participate in the visual observation of it, provided the ephemeris was communicated to the stations in ample time. On the part of the Russians they were ready to communicate the ephemeris of their satellite to countries that will observe it. The data obtained from these observations is relayed to a common station by telephone. They provided training for their ground observer crews by using jet aircraft. One practice alert was conducted on 24 September and a second on 1 October. It was also stated that China had ordered some of their telescopes.

9. This particular Congress had much greater press representation than any other technical meeting I have ever attended. There were numerous European press representatives (reporters and photographers). From the U.S., Newsweek, Time, Life, Aviation Week and the N. Y. Times were represented that I know about, perhaps others. The USSR delegates were definitely the center of attraction. Starting with the initial reception on Sunday evening, 6 October, and continuing throughout the entire week, the press representatives were continually swarming around the Russian delegates. Photographers were continually snapping photos of the Russians as they sat in the audience and as they gathered outside the conference room during informal discussions. At the time that Madame Kurnosova made her presentation on the cosmic ray instrumentation seven photographers crowded around while she was putting formulae on the blackboard. A couple of times the chairman had to ask them to stop, particularly when noisy movie cameras were grinding. The reporters also talked to U. S. participants in an attempt to get their reaction which was quite varied. The range was from complete frenzy on the part of some in the need for an all out program of some sort to surpass the Russians and counteract the satellite publicity to a somewhat calmer attitude and one that tended to look at the long range program that could be possible. One reporter made the comment that the Americans appeared to be more afraid of Washington than of Moscow.

10. The administrative arrangements and administrative procedure for conducting the meeting were very poor. The conference room was an outside room and of course not air conditioned; with the windows open it was too noisy and with the windows closed it of course got too hot and stuffy. At the opening session when delegates first reported in the Spanish administrative personnel were not yet prepared to issue the registration cards. During the meetings when the slides were shown, they never did have a screen, projecting directly on the wall. Most of the slides didn't fit properly into the obsolete projector. The slide operator invaribly put them in wrong. The room lights could not be operated by the projectionist, necessitating a delay each time the lights had to be turned on or off. The projector cut off the corners of the slides. Insufficient copies of technical papers were available. The scheduled time for the papers was frequently changed without the audience knowing about it. They had no blackboard at first. The movie operator did not take the trouble to thread the film through prior to the showing and in general there was a lack of attention to detailed arrangements.

11. I was surprised to find that one of the papers given was titled "The Communications Satellite" by Mr. R. Haviland, General Electric Company, Missile and Ordnance Systems Department. I presumed that this work was being done with advanced nose cone funds as he said that he was working for Mr. Cowles although I did not understand how this could be justified. Considering the salaries of two or three people working with him along with possible computer time this might cost upwards of $100,000 per year. I brought this particular item to Colonel Dodge's attention who queried Mr. McFall about this on his recent visit to BMD. Mr. McFall said that Mr. Haviland was doing the Communications Satellite work on his own.

12. Major George Colchagoff was present at the Congress representing Headquarters ARDC. His primary purpose in attending the Congress was apparently to determine if there were any on-the-shelf subsystem components available any place in Europe for R&D system #609L "Ballistic Weapons Research & Development Support System".

13. Some newspaper reporters made a brief survey of the reaction of the Spanish public to the launching of the Russian Satellite. They brought back the report that the general opinion was that the Russians not only beat us but they were nine times stronger. Apparently the ratio of the Russian Satellite weight to our IGY Satellite weight was being translated directly into a measure of military strength.

14. Prior to my trip and in anticipation of visiting the European office of ARDC I had the three Technical Divisions review the contracts and proposals of this office as obtained from their monthly activity report with the idea of determining the degree of interest in certain areas of research. This interest was broken down in three ways, first, interested in obtaining reports if the project was funded by another

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organization, second, interested to the extent of supporting financially and third, interested in obtaining more information prior to deciding whether we were interested in reports or financial support. In addition to this, a list of projects was prepared by each Division of general areas in which unclassified research might be performed. I presented all of this material to Colonel Gossick, Commander, EOARDC, and his staff. I found that a considerable amount of work had already been performed and a considerable number of reports had already been written on many areas in which we are interested. Their procedure for handling reports is to require one hundred copies of each report, four copies of which are retained by EOARDC, one for permanent file the other three for loan in Europe. The other ninty-six are sent to the sponsoring agency. Most of these are of sufficient importance to also be made ASTIA documents. We have not been on the distribution list for even a listing of these reports but I saw that we did get on and I brought back a list of the reports which are already in existence. This is being reviewed now by Capt Albert who will take the necessary action to obtain one or two copies of these reports in which the Technical Divisions have previously expressed some interest in the project. Of the four projects in which the Technical Divisions expressed some possible interest in supporting financially three of these are already funded for another year and the remaining one probably will be funded. I brought back with me seven new proposals in areas in which the three Divisions had expressed an interest. These are being reviewed by the appropriate Divisions. I found that quite a bit of work is going on in Europe in Ionospheric and Tropospheric propagation investigations, ionization, transition and atomic clocks. Apparently no work is underway on gravity anomolies. At the present time there is no immediate requirement for funds to be transferred to EOARDC, however, there may be some requirement as a result of the proposals that are being reviewed. Therefore, the $75,000 presently programmed for support of this office should not be reprogrammed at the present time.

15. During my attendance at the Congress I formed many opinions as a result of personal contacts with the scientists and engineers of many countries who are working on astronautical problems. In order to emphasize the major conclusions I will state only those that I feel are of sufficient importance to warrant action.

a. LUNAR VEHICLE

(1) The Russians have an active development project for a lunar vehicle of some sort. There is no doubt in my own mind about this. With the propulsion and guidance capability for placing an 1,100 lb satellite on orbit, they certainly have the capability for placing a reasonable payload on the moon. The Russian literature, as documented by both RAND and ATIC, indicates that they have been working on this for some time.

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(2) From all of the newspaper and magazine articles that have appeared recently in connection with lunar flight possibilities and the emphasis, particularly in foreign newspapers, on the "Race to the Moon", it must appear to the general public of the world that the U.S. does have an active development project for a lunar vehicle. This impression has been generated by the numerous reports and papers that have been published as a result of the many technical feasibility studies that have been undertaken by individual organizations. These studies, however, have not been connected with an approved development project for a complete system.

(3) True, we do have the capability and the feasibility was recognized long ago but there has been no high level sanction for such a project. In fact, the reaction at top levels in Washington has been just the opposite. It is my understanding that committees such as the Teller Committee that have been organized since the Sputnik launching to look into "what is wrong?" and "what can be done?" have steered clear of proposing anything that would interfere with our current programs. I am heartily in accord with this but I believe that we are obligated to inform higher governmental levels on just exactly what our capabilities are and what might be done without seriously jeopardizing our current programs. Industrial concerns and other governmental organizations have made feasibility studies and proposals involving various types of boosters but the most promising of these requires boosters of the size we are developing to put a reasonable payload on the moon. Therefore, we are the only organization that could attempt to schedule the development of such a vehicle.

(4) We presently have available Part II of the Advanced Weapon Systems Study which is a Pilot Study of Lunar Rockets. It covers feasibility for various types of trajectories and includes some very preliminary design sketches. I propose that we rapidly prepare a preliminary Development Plan indicating what could be done and when by diverting a few Series D Atlas missiles for this purpose. This Plan should then be presented in detail by a carefully selected briefing team not only to Hq ARDC and Hq USAF but to the DOD, the State Dept or the NSC or to whatever level is necessary to obtain a decision on whether to proceed or not. I feel that the top governmental levels should have a firm proposal from the organization capable of carrying it out. Then, if a negative decision is reached, the word should be

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disseminated in such a fashion that the world at large will know that we are not in any "Race to the Moon". If this is not done, it will appear when the Russians accomplish such a mission that we have lost the race; a race we were never in. Even though an affirmative decision is made there is still a strong possibility that we will lose. In fact, there is a strong chance that the Russians may follow up immediately on their advantage and accomplish this even before a decision is made on whether we compete with them or not.

(5) To make my position clear, I am neither advocating that we have or not have a lunar project. All I am trying to say is that:

(a) We should make key echelons of governmental management cognizant of our capabilities and limitations so that a decision can be reached based on facts.

(b) If a negative decision is reached that the world be informed in an appropriate manner so as to forestall as much as possible further loss of national prestige.

b. MILITARY PARTICIPATION IN INTERNATIONAL TECHNICAL MEETINGS

(1) When military or civilian personnel of two or more of the military services actively participate in international technical meetings to the extent of presenting papers or acting as chairman of sessions, complete coordination should be performed beforehand in order that the best possible impression is left with the representations of other nations.

c. EUROPEAN OFFICE - ARDC

(1) I feel that this office is doing an extremely good job commensurate with their mission and available funds. They have already done much that is of interest to us and many of the reports that have already been published will benefit our program. I think that we could have benefited earlier had a personal contact been made sooner. I have now initiated action to take full advantage of what has already been done and this information will be available soon at no outlay of funds on our part.

~~CONFIDENTIAL~~

Lawrence D. Ely

LAWRENCE D. ELY
Colonel, USAF
Director, Technical Divisions
Weapon Systems

2 Incls.
1. Program of IAF
2. List of Papers

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PAPERS AVAILABLE IN WDTL FROM
8th INTERNATIONAL ASTRONAUTICAL CONGRESS
BARCELONA, SPAIN

UNITED STATES

TITLE	AUTHOR
Selenoid Satellites	W. B. Klemperer and E. T. Benedikt
Attitude Control of a Satellite Vehicle - an Outline of the Problems	R. E. Roberson
Balloons Play Key Role in Upper Atmosphere Research with Rockets	Otto C. Winzen
Meteor, Jr., a Preliminary Design Investigation of a Minimum Sized Rocket Vehicle of the Meteor Concept	Darrell C. Romick, Richard E. Knight and Samuel Black
Vertical Recovery - Feasibility of the Physical Recovery of Scientific-Research Payloads from Very-High-Altitude Near-Vertical Trajectories	R. T. Patterson
Recovery Techniques for Manned Earth Satellites	Norman V. Petersen
Optimization Considerations for Orbital Payload Capabilities	H. H. Koelle
Spaces of Potential Visibility of Artificial Satellites for the Unaided Eye	Ingeborg Schmidt, M. D.
On the Generation of Temperatures to 30,000° K	Peter E. Glaser
Sodium Emission at 140 km	E. R. Manring and J. F. Bedinger
Applications of Satellorb (Satellite Simulating Observation and Research Balloon)	David G. Simons
The Problem of Variable Thrust	W. N. Neat
Research Goals in Astronautics	Colonel W. O. Davis
Producting the Weightless State in Jet Aircraft	S. J. Gerathewohl, O. L. Ritter and H. D. Stallings, Jr.
The Communication Satellite	R. P. Haviland

Design and Performance Data of Space Ships with Ionic Propulsion Systems	Ernst Stuhlinger
Recovery of a Circum-Lunar Instrument Carrier	Carl Gazley, Jr. and David J. Masson
Interplanetary Ballistic Missiles - A New Astrophysical Research Tool	S. F. Singer
Die Entwicklung der Rechtsbegriffe im Weltraumrecht	Andrew G. Haley
Optical and Visual Tracking of Artificial Satellites	Fred L. Whipple and J. Allen Hynek
Optimum Burning Program as Related to Aerodynamic Heating for a Missile Traversing the Earth's Atmosphere	Angelo Miele

USSR

Investigation of Cosmic Radiation by Means of an Artificial Earth Satellite	L. V. Kurnosova
The Nature of Cosmic Radio Emission and the Origin of Cosmic Rays	V. L. Ginzburg
Visual Observations of the Earth's Satellite in the USSR	A. G. Masevich
Some Problems Relating to the Dynamics of the Flight to the Moon	V. A. Yegorov
Determining the Time of Existence of the Artificial Earth Satellite and Studying Secular Perturbations of its Orbit	D. E. Okhotsimsky, T. M Eneiev and G. P. Taranynova
Study of the Primary Cosmic Radiation by Using Artificial Satellites of the Earth	S. N. Vernov, V. L. Ginzburg, L. V. Kurnosova, L. A. Razorionov, M. I Fradkin

FRANCE

Essai de Contribution à l'autopropulsion nucleaire	J.-J. Barre'
Pilotage d'un Astronef par des Moyens Radioelectriques	H. Gutton
Essai de Contribution a la Propulsion Ionique	J.-J. Barre'

BRAZIL

Tentative Demonstration of a Probable Connection Between Meteorological Disturbances on the Planet Mars and the Maxima of Solar Activity	Thomas Pedro Bun
The Displacement of the Solar System Throughout the Galaxy; It's Geological and Biological Influence in the Past and in the Future	Thomas Pedro Bun, C.E.
A Contribution to the Problem of Space Law Establishing a Technical and Practical Limit to Political Sovereignty in Height	Sociedade Interplanetaria Brasileira
"Biospheric Index" A Contribution to the Problem of Determination of Extra-Solar Planetary Biospheres' Existance	Flavio Augusto Pereira and Thomas Pedro Bun
A Theory of Nightly and Hibernal Anabiosis of the Ultra-Xerophytic Flora and Possible Symbiontic Fauna on Mars	Flavio A. Pereira, S. D.

ITALY

Previsione Tempestive delle Caratteristiche del Moto di Mobili Aero-balistici nella Cibernetica Aeronautica	C. E. Cremona
Associazione Italiana Razzi	

SWEDEN

The Weight of Minimum Cost Orbital Ferry Vehicles	Bjorn Bergqvist

GERMANY

Uber Stabilitatsuntersuchungen an Flussigkeitsgetriebenen Raketenmotoren mit Hilfe des Verfahrens der Harmonischen Balance	G. Heinrich and W. Peschka
Uber die Stromung von Zweiphasengemischen	H. Bednarczyk

HOLLAND

On Relativistic Rocket Mechanics	J. M. J. Kooy

GREAT BRITAIN

The Probability of Intelligent Life Evolving on a Planet	Alan E. Slater

[redacted] ~~CONFIDENTIAL~~

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MEMORANDUM FOR COLONEL TERHUNE

OCT 31 1957

SUBJECT: Informal Reaction of the "Stewart" Committee on Special Capabilities to the 18 October Presentation on WS 117L

1. I was visited today by Mr. Robert Buckheim of Rand, who as you may know is a member of the subject committee. His purpose was twofold: to tell me of the reactions of this committee to our presentation to them on WS 117L, and further to discuss what was taking place in regard to the committee's actions in the near future which might affect AFBMD.

2. Attached are some very brief remarks that he gave to me, as not only informal but not the unanimous view of the committee.

3. While undoubtedly it can be claimed that WS 117L is a complex system I have yet to have any of these helpful people tell us in any way, shape or fashion just how we could go about reducing the complexity of the proposed development and still meet the GOR under which we are operating. I might also point out that this was the same Stewart committee that advised the Navy on the approach that they should follow on VANGUARD and it is not evident (to be charitable) that this was the best way available to the Navy at that time to go about doing the job.

4. You will note from the attached a strong interest in the exploitation of the IRBM as a booster for some sort of a satellite vehicle. I understand further that the committee is scheduled to meet again on or about the 14-16 November to consider this matter further and that the Air Force has been asked to supply its views on this matter. I am not aware, however, of any inquiry directed to AFBMD other than that contained in AFBMD Telecon Number 48 with Col. Nunziato as of yesterday for any request for information on this subject. In preparation for a possible request of this type I have asked Buckheim to have Rand look into the engineering feasibility of such a satellite plus military usefulness of the exceedingly limited payload that this development would offer. He has indicated to me that they were already at work on this and expected to have some views available in anticipation of the forthcoming committee meeting. I have also asked Cmdr. Truax to study the problem since it might well come up during my absence next week.

5. I have no information on what the AFBMD position is on such a proposal but I would offer the following suggestions in the event that this is considered at the appropriate level in the near future.

a. While such a satellite could be built it would undoubtedly take nearly as long as we think we require to build the WS 117L vehicle particularly for a militarily useful payload. Even though one might claim that the Thor or Jupiter could be available earlier than the Atlas as a booster, there are a number of auxiliary problems particularly if this is for a reconnaissance satellite version which would make the foreshortening of the development time either very chancy, very costly, or both.

[illegible]

[illegible]

[illegible]

~~CONFIDENTIAL~~ [redacted]

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

[redacted] ~~CONFIDENTIAL~~

b. Our preliminary estimate is that at best we could expect to put a reasonable payload of about 300 pounds (including the weight of the spaceframe) on a 300 mile orbit or less with an IRBM booster. Because of the maximum velocity capable with an IRBM there is very little growth potential foreseeable in its use as a booster for a large military satellite, i.e. why put up another Sputnik one or more years later.

c. Were a vehicle based on THOR to be developed before we had the WS 117L vehicle flying we could undoubtedly use space aboard the smaller vehicle as a test bed for a number of the critical components of the WS 117L system. It would, however, have its greatest applicability as a carrier of scientific payload.

d. In view of the funds that would possibly be required for such development, i.e. greater than $100,000,000, I feel that such an effort could best be applied toward future generation systems of either the ballistic missile or satellite type rather than to put up a middle size satellite which would have the limitations described above.

5. If there is anything further that you wish WDTR to do in connection with the upcoming Stewart committee meeting on the grounds that we might be called upon, please let me or Truax know. I have suggested to Buckheim that he suggest to the Committee Secretariat that the dates proposed (14-16 November) would be in serious conflict with commitments of the WS 117L project office should our presence be desired at this meeting.

Incl.
1 page
Unclassified

FREDERIC C. E. ODER
Colonel, USAF
Director WS 117L

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1. System described seems extremely complex.
2. Some skepticism about need for such complexity to satisfy the performance requirements indicated.
3. Apparent complexity seems to cast grave doubts on schedule.
4. Strong feeling that something useful can be done sooner with a simpler system.
5. Belief that pressing need exists for some capability prior to realization of system presently programmed.
6. Seems desirable to proceed in step-wise fashion, accepting limited objectives as valid ones to exploit best capabilities available at any given time.
7. Present item of major interest is IRBM and how it can be put to use in military and/or scientific satellite program.
8. General belief that IRBM can yield a useful military satellite capability.
9. Strong belief that IRBM can be useful in providing satellite test bed for components of more ambitious systems like presently-conceived one.
10. Considerable objection to notion that use of IRBM-derived satellite would constitute "dead-end" testing.
11. DOD has solicited, and will receive in mid-November, proposals from Army and Navy on military satellites.
12. Likely that at least one of these will proceed from IRBM, and, as a minimum, the AF will have to have an organized stand on such a capability.
13. Further detailed discussion is desired on such things as: ground data processing, how resolution objectives were arrived at, choice of the Hustler engine, infra-red detection, need for secure data transmission system, etc.

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C O P Y

1 Nov 57

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/~~CONFIDENTIAL~~/ CITE AFMPP 52291/COM AMC PASS TO MCFP FOR ACTION AND TO MCSR FOR INFO. THIS MSG IN 2 PARTS
PART 1. PROCUREMENT AUTHORIZATION NO 19-240-58 FOLLOWS CLN YOU ARE AUTHORIZED TO ESTABLISH P-244 CATEGORY I CSN 58-244-720A /GROUND HANDLING EQUIP WS -117L/ IN THE PROGRAM AMOUNT OF $2,400,000. THIS ACTION WILL INCREASE THE P-244 CATEGORY I PROGRAMMED COST ESTIMATE IN THE AMOUNT OF $2,400,000 FROM THE FORMER TOTAL OF $402,400,000 TO A NEW REVISED TOTAL OF $404,800,000. THE FY 58 PROGRAM TOTAL FOR P-240 IS $430,676,900 IN CATEGORY I, AND $71,600,000 IN CATEGORY II.
PART 2. PROCUREMENT AUTHORIZATION NO 14-260-58 FOLLOWS CLN THE FY 58

400,000

PAGE TWO RJWPNF 23F
PROGRAM TOTAL FOR P-260 IS $173,926,850 IN CATEGORY I. THE RESULTS FROM CLN /A/ CATEGORY I CNS 58-261-700 IS REDUCED FROM $32,800,000 TO $30,400,000 /B/ IN AMOUNT OF $2,739,000 INCLUDED FOR DEWLINE MAIN IS WITHDRAWN, /C/ OF THE AMOUNT OF $400,000 ESTABLISH FOR P-265, CATEGORY I, $343,150 IS WITHDRAWN AWAITING FINAL DIRECTION P-265. THE DIFFERENCE IS PROCUREMENT AUTHORIZATION NO 13. CATEGORY 2 TOTAL OF $23,800,000 REMAINS UNCHANGED. BUDGET HAS COORDINATED
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DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

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~~CONFIDENTIAL~~

FOR IMMEDIATE RELEASE
4 November 1957 57-13

Subcommittee on Department of Defense Appropriations
Appropriations Committee
House of Representatives

Honorable George H. Mahon, Chairman of the Subcommittee has called a meeting of his Committee for November 20, in Washington D. C. for the purpose of exploring with Secretary of Defense McElroy, Deputy Scretary of Defense Quarles and others, the overall progress on the Ballistic Missile and Satellite programs of the Department of Defense.

In preparation for that meeting, some members of the Subcommittee are visiting the Air Force Ballistic Missile Division associated testing and production facilities on the West Coast for a first hand look at the status of the Air Force Ballistic Missile Program. This program includes the ICBM's ATLAS and TITAN and the IRBM THOR.

Five members of the 13 man Subcommittee now in Los Angeles are: George Mahon (D) Texas, Chairman of the Subcommittee; George Andrews (D) Alabama; Richard B. Wigglesworth, (R) Mass; Evrett P. Scrivner (R) Kansas; and Harold Ostertag (R) New York.

Today the Committee members have participated in a series of meetings with Major General B. A. Schriever, Commander of the Air Force Ballistic Missile Division (ARDC) in Inglewood, California and his staff. Honorable William M. Holaday, Special Assistant to the Secretary of Defense for Guided Missiles is also participating in the meetings.

Tuesday, November 5, the party will visit Convair at San

Diego to inspect the ATLAS intercontinental Ballistic Missile production and test facility. Wednesday, November 6, they will go to Sacramento for an inspection of Aerojet-General liquid rocket engine manufacturing and test areas and Douglas Aircraft Company THOR intermediate range ballistic missile and captive test site in Sacramento, California.

Additional installations, including the Army Missile Agency at Redstone Arsenal in Alabama will be visited on subsequent dates.

Mr. Mahon indicated that the Committee is reviewing the entire United States missile effort to determine the relative status of the programs and what if anything can be done to accelerate them. He does not want to comment on his conclusions as to how well the programs are progressing until he has completed his review.

END

ATTENDANCE LIST
HOUSE COMMITTEE ON APPROPRIATIONS
4 November 1957

Presentation Center
Col. Boatman, OIC
~~TOP SECRET - NON SECRET~~

Representative George H. Mahon

Representative Errett P. Scrivner

Representative George W. Andrews

Representative Harold Ostertag

Representative Bob Sikes

Representative Richard B. Wigglesworth

~~Mr. Samuel W. Crosby~~

Mr. Earl C. Silsby

Hon. William M. Holaday

Mr. A. G. Waggoner

Col. D. E. Williams

Mr. D. W. Patterson

Mr. Ralph Preston

Col. B. L. Baker

Lt. Col. R. A. Scurlock

Comdr Ernest W. Dobie, USN

Col. R. E. Coffin, USA

PRESENTATION TIMING

Morning

0910 - 0945	Introduction by General Schriever
0945 - 1000	Questions and discussion
1000 - 1035	Quarterly and special (107, 108, 109) films
1035 - 1100	Questions and discussion
1100 - 1125	Coffee break
1125 - 1205	Colonel Terhune (about 10 minutes interruption by questions)
1205 - 1235	Dr. Ramo

Afternoon

1350 - 1415	Dr. Dunn (about 10 minutes interruption by questions)
1415 - 1450	Colonel Large (about 7 minutes interruption by questions)
1450 - 1500	Colonel Jacobson (about 4 minutes interruption by questions)
1500 - 1510	Dr Ramo re "Muttnik"
1510 - 1525	Facilities film
1525 - 1535	Colonel Leonhard
1535 - 1550	Coffee break
1550 - 1620	Commander Truax
1620 - 1625	Questions and discussion
1625 - 1630	General Funk
1630 - 1645	Colonel Bishop
1645 - 1700	Colonel Shumsky
1700 - 1705	Questions and discussion

~~CONFIDENTIAL~~

5/13

BRIEFING ON WS 117L TO THE AIR COUNCIL

5 Nov 1957

~~CONFIDENTIAL~~

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[redacted] ~~CONFIDENTIAL~~ Myf 2-9-1

BRIEFING ON WS 117L TO THE AIR COUNCIL

CHART #1

1. PURPOSE OF THE BRIEFING IS TO:
   a. Discuss the worth factors of the AF Advanced Reconnaissance System WS 117L in the light of intelligence requirements and the over-all U. S. capability to fulfill these requirements.
   b. Review the technical features of the WS 117L, the planned developmental landmarks and the cost.
2. THE KEY DISCUSSION AREAS WILL INCLUDE:

CHART #2

   a. Need for Intelligence
   b. Intelligence Requirements
   c. State of knowledge and collection constraints
   d. Collection capability of WS 117L
   e. Comparison of collection systems
   f. Concept of WS 117L employment
   g. Review of technical program features
   h. Program costs

   so that the capability and worth of the WS 117L can be most easily and readily examined in relation to its cost and the demands of other projects.
3. Since the first three discussion areas have been covered by previous speakers, I will confine my discussion to establishing the role of the ARS in relation to these areas.

[redacted]

~~CONFIDENTIAL~~

4. Measured against present intelligence requirements our state of knowledge is extremely inadequate and in general out dated, although it is recognized that our recent special efforts have gone a long way toward a one-time up-dating of some of this information.

5. It is well recognized that our Security Services through radio and electronic devices provide a great amount of vital data, some of which could not be gathered by any other means. Yet it is equally well recognized that photographic over-flight can increase our present knowledge of the Soviets

- more extensively
- more accurately and
- more rapidly than any other means.

Photography has a unique advantage over practically all other kinds of intelligence in that it provides quite definite, credible, unambiguous information.

CHART #3

6. Briefly then let's quickly review the extent of our "photo take" today:

a. This represents the approximate photo coverage of the USSR accomplished by the German Luftwaffe in 1943-44. It extends through European Russia with incomplete coverage up to about the Ural Mountains. Until very recently and with minor exceptions this has formed the main basis of our information on airbases, the transportation system and Soviet industrial locations for our strategic targeting program.

CHART #4 b. In the 1951-52 period we began the LOROP (Long Range Oblique Photography) operation, the use of long range cameras to accomplish oblique photography from along the periphery of USSR. This represents the areas of useful photo take possible with these operations.

CHART #5 c. The reconnaissance balloon project of 1956 produced approximately this coverage.

CHART #6 d. Recent special efforts still underway are believed to have generally covered the areas noted. Although this system is technically and operationally capable of covering considerably more, its operations have been stringently constrained by political countermeasures.

CHART #7 7. We can tentatively conclude from this brief review that:

a. Our needs far outweigh our present capability.

b. The nature of the intelligence problem requires:

(1) Very broad geographic coverage

(2) Very deep penetration

(3) Recurring looks at the same areas to detect change

This latter point is exemplified by such things as the length of time required to construct and conceal a missile launching site. The recycling time of our reconnaissance must not be too great.

8. Very closely associated with these conclusions are a number of formidable constraints which we have to recognize may limit or completely void our future aerial collection activity unless we design around them.

CHART #8

a. Weather is the chief limitation to photographic reconnaissance. Even during the most favorable seasons of the year in Russia, weather conditions will increase the over-flight sortie requirement probably by a factor of 4 or 5.

b. Geographic relationship between secure bases and the vast areas of Russia places long range problems on our reconnaissance systems similar to those of our striking force.

CHART #9

c. Enemy Air Defense System is forcing us to higher and higher altitudes.

d. Political invulnerability requirements for unauthorized overflight operations call for systems with:

(1) Low probability of detection

(2) Absolute minimum probability of being lost to enemy action

(3) And ones which are not of such types and numbers as to easily be mistaken for the initiation of a US attack.

Without a high degree to all of these features it has been proven that political countermeasures will be used to cause a halt to the operation.

9. Against this background of what intelligence we need, what intelligence coverage we now possess and the difficulties being imposed on our future conventional collection capabilities, let's examine the collection capabilities of the WS 117L.

a. We can generally state that post-war advances in the photographic and electronic arts have been such that the fully developed photographic reconnaissance satellite will produce information approximately equivalent in detail to average high altitude WW II photography.

b. The worth of this reconnaissance system was first based upon qualitative approximations of the collected product.

c. Qualitative approximations have given way to:

(1) Laboratory simulation work

(2) Paper analytical comparisons of WW II capabilities with predicted satellite capabilities based on photo emulsion advances and the unique photo platform the satellite will make

(3) Emperical checks through flight tests using high altitude balloon.

CHART #10
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15

DISCUSS CHARTS -
THE DETAIL OBSERVABLE
THROUGH P. I. REPORTS

10. This quality is a result of improvements in both films and optics. Results have been carefully reviewed by such groups as the President's Science Advisory Committee and given their wholehearted indorsement as to over-all validity and feasibility.

CHART #16

11. Another attribute of the Advanced Reconnaissance System which should be brought to your attention is the quantity of reconnaissance data produced by this system. To collect reconnaissance data the satellite will be flown on an orbit inclined 83° with the equator at an altitude of 300 statute miles. The orbit will be retrograde in that it will move contrary to the direction of the earth's rotation. The retrogression rate of this orbit is such that the satellite will operate with the sun in the orbital plane over the Sino-Soviet Bloc at approximately the same time of day (noon) during all seasons of the year.

CHART #17

12. With the search type 6" focal length vertically fixed camera system the satellite on such an orbit will cover a swath on the ground 100 miles wide. This will effect complete photographic coverage (ignoring cloud cover, precipitation, etc.) of the USSR and its satellites in a 15 day period which will include considerable overlapping side cover.

The initial power supply limitation of 30 days useful life will therefore provide coverage of the Sino-Soviet Bloc two separate times per vehicle, each cycle providing considerably duplicate cover.

Expressed in more tangible terms each satellite search vehicle will have the capability of photographing 36,000,000 square miles within a month or 1,200,000 square miles/ day.

The weather conditions of the area of interest is such that with four (4) times coverage (60 days operation) there is a 90% probability of getting a complete "photo map" of all of USSR and its satellites.

13. ~~The higher resolution photographic system which utilizes~~ a 36" focal length camera which can be directed at preselected targets occurring within approximately 150 miles of the orbit path. The capacity of the system will permit the specific surveillance of a finite number of targets anywhere within the USSR and Communist Bloc territory once every five (5) days. Based on an average target area of 17 x 17 miles this system can cover 120 such size targets per day or any other appropriate combination of the above.

The total target area coverage possible per vehicle is 1,000,000 square miles for a 30 day life vehicle.

When weather factors are taken into account there is a 90-95% probability of covering any number of selected targets within the 30 day period. (This would afford a 6x look/target).

CHART #18 14. Another way of looking at the quantitative performance of the ARS is by comparing it with the number of sorties required by specially developed manned systems to obtain this same coverage. It has been estimated that 200-225 successful overflight search sorties will be required to provide one time complete small scale photo cover of the USSR and Communist Bloc (disregarding weather). When weather factors are considered this estimate will conservatively increase by a factor of 4.

For the same probability of achieving useable search type photography of the area (average of 4x coverage to minimize weather factors).

a. 800-900 individual penetrations by special aircraft will be required.

b. Compared to 60 days of satellite operation (2-30 day life satellites).

It can be seen that a considerable force would be involved to duplicate the timeliness of the cover and that the number of penetrations required to achieve just one-time coverage of the entire area places a very low confidence figure on the assurance of completing the job before political countermeasures are effective in turning off the operation. Certainly it is inconceivable to believe regardless of how much desired that a continuous overflight program of the scope required to provide timely, repetitive cover of the 9×10^6 miles can be conducted by employing special aircraft systems alone.

CHART #19 15. Now that the qualitative and quantitative worth of the ARS has been established, let us turn to a comparison of the effectiveness of various future reconnaissance systems as a function of time. Balloon borne devices will lose effectiveness because of increasing Soviet countermeasures capability LOROP (Long Range Oblique Photography) will continue to have about the same effectiveness. For a while penetration flights will be valid but will suffer a drop in effectiveness as they tend to be overtaken by

Soviet Air Defense capability. They may increase with introduction of new techniques such as boost-glide devices. The ARS will be far less susceptible to Soviet air defenses and, if its purpose and capability is properly protected, will not be subject to political countermeasures since the Soviets themselves have stated their intentions of launching satellites on high latitude orbits.

(omit chart 20)

~~[illegible]~~ 16. Here is a qualitative comparison of the reconnaissance system effectiveness with time – based on their ability to satisfy the constraints discussed – mainly air defense and political invulnerability.

CHART #21 17. Next, let's compare these systems against some criteria relating to the intelligence needs and the constraints imposed.

CHART #22 18. From all this it is concluded that:

a. Intelligence requirements are increasing from a point of view of total cover, timeliness, and repetitive looks.

b. Collection capabilities of conventional systems are decreasing.

c. WS 117L will overcome the major constraints that limit other systems.

d. WS 117L System can satisfy a large portion of the critical intelligence needs.

e. The WS 117L should not be considered a completely independent system.

Other complimentary higher resolution collection systems are definitely required. The efficiency of these other overflight systems can be greatly increased by the use of the WS 117L in a programming role, thereby decreasing over-all risk and improving political acceptability of required minimum number of overflights.

CHART #23 19. Now let me briefly review the technical program of WS 117L. The Advanced Reconnaissance System program is not a new concept. The RAND Corporation was organized in 1945 to study the feasibility and utility of a satellite vehicle. Their studies and conclusions, which were accepted by the Air Force, led to the initiation of development of subsystems and components critical to a reconnaissance satellite as early as 1951. These were organized into Project 1115 in 1954. In 1955 responsibility for the ARS was transferred to WDD (now AFBMD). A development plan for WS 117L was submitted and approved last year (1956) and a systems development contract let with the Lockheed Missile Systems Division (chosen after a considerable design study competition).

CHART #24 20. The reason for assigning the ARS project to AFBMD was due to the fact that the satellite requires a booster similar to an ICBM (less nosecone). The contributions of the ICBM program to the development of a large satellite go beyond the provision of a booster.

CHART #25 21. The satellite designed for the Advanced Reconnaissance System is essentially a powered "nosecone" fitted on the body of an SM-65 by an adapter flange. The gross fueled weight of the satellite plus adapter is 9300 lbs. This device places a useful payload of nearly one ton on a precise orbit 300 miles above the surface of the earth. It is powered by the XLR-91 rocket engines which uses JP-4 fuel and RFNA oxidizer.

✓ CHART #26 22. The XLR-91 engine was developed by Bell Aircraft Company to power the pod for the Hustler. Prior to cancellation of the Hustler pod program the XLR-91 completed nearly all of its Preliminary Flight Rating Tests.

✓ CHART #27 23. This is the "Space Utilization Mockup" of the ARS vehicle built by Lockheed shown with the adapter section pulled back. The vehicle is 21 feet long and 5 feet in diameter.

24. The payload of the photo-reconnaissance satellite consists of the visual subsystem, attitude stabilization equipment, auxiliary power, and the vehicle portion of the ground-space communications subsystem.

✓ CHART #28
✓ 29
✓ 30
25. A prototype camera and film drive have been built and are undergoing tests by Eastman Kodak, as is the film

processor. The film read-out equipment is undergoing breadboard tests by CBS Laboratories. The pictures you saw earlier were actually "read-out" with this breadboard equipment.

26. Major sub-assemblies of the attitude stabilization equipment are undergoing preliminary testing at the MIT Instrumentation Laboratory.

CHART #31 27. Our present test schedule envisages a first test from AFMTC in May 1959. This will not be an orbiting flight but will test such items as satellite engine start, separation, vehicle erection, etc. Orbital flights begin with flight 5 and the first visual reconnaissance flight is scheduled as flight 10 on a low latitude path.

CHART #32 28. In order to meet the GOR for WS 117L a funding program such as is shown would be needed. This is that contained in the System Development Plan. Note that funding deficiencies for such a program began in FY 57. Note that by the program our first test flight was in 1958.

CHART #33 29. Because of funding shortages in FY 57, ARDC submitted in January 1957 a financial plan and budget estimate as shown. The schedules show a slip from the previous one by approximately 6 months.

CHART #34 30. In order that we not slip the program way out of context with its need, this is a minimum program for WS 117L. Note that the first launch date has slipped one year from that of the development plan schedule.

31. **CONCLUSION:** You have been shown the worth factors of the ARS in light of intelligence requirements and the over-all capability of the USAF to fulfill these requirements. The system is badly needed and is feasible. Program costs are not exorbitant and represent a minimum cost program consistent with military need and the technical problem involved.

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~~CONFIDENTIAL~~

C O P Y

5 Nov 57

NFA004
RR RJWPNFB
DE RJWPNF 14F
R 051538Z
FM HEDUSAF WASHDC
TO ZEN/COMAMC WPAFB OHIO
INFO RJWPNFB/COMAFBMD HQ ARDC INGLEWOOD CALIF
BT
/~~C O N F I D E N T I A L~~/CITE AFMPP 52392. COMAMC FOR MCFP. AFMPP MSG 516689 18 OCT 57 LIMITING OBLIGATION AND COMMITMENT AUTHORITY TO $15.9 MILLION THRU JAN 1958 ON PA 58-95 /ARS WS117-L/ IS HEREBY RESCINDED.
BT
THIS "AC" MSG
06/0045Z NOV RJWPNF

DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

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~~CONFIDENTIAL~~

WDTIA

8 November 1957

MEMORANDUM FOR RECORD

SUBJECT: THOR Space Flight Capability

1. On 2 November a request was received from Headquarters, USAF, for AFBMD's assistance in preparing a presentation to the Armed Forces Policy Council concerning USAF capabilities and plans for space flight testing. A meeting was held at AFBMD on 3 November to prepare a joint AFBMD/RW/DAC position on the capabilities of THOR for this mission. Present at this meeting were the following:

AFBMD - Colonel Terhune
Lt Colonel Jacobson
Lt Colonel Hale
Lt Colonel Greene

R/W - Dr. Mettler
Mr. Donovan

DAC - Bob Johnston
Jack Bromberg

2. This group reviewed the findings of the "Barlow" Sub-committee of the "Teller" Ad HOC Committee and agreed to the proposal made by DAC that the use of the Vanguard third stage plus THOR could realize the earliest practical capability for a large satellite or for a moon rocket.

3. Briefly, the performance capability of THOR plus a single Vanguard Third stage, solid rocket could place 150 pounds on orbit at an altitude averaging 300 nautical miles. AC Guidance would not be required if orbit eccentricity would be acceptable. This configuration was labeled as Case I. Case II called for THOR, plus a second stage consisting of four Vanguard Third stage rockets and a Third stage consisting of a single Third stage Vanguard. This configuration could place 600 pounds on a 300 mile orbit or 50 pounds in the vicinity of the moon.

4. Case III had the same configuration as Case II except that more sophisticated experiments had been considered. There was also a possibility that a single rocket such as a one-fourth length Aerojet, 40 inch solid rocket could replace the cluster of 4 Vanguard Third stages.

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5. The following schedules were agreed as being feasible and also not seriously damaging to the THOR program.

a. Missiles 114, 116, and 118 could be used for Case I and Case II experiments. The Case I experiment could be conducted by 1 March and Case II experiments could be conducted by 1 May, 1958.

b. If Douglas would be authorized to increase their production, as many as six additional missiles could be made available for space flight testing between July and December 1958.

This schedule hinged completely upon immediate availability of the technical details of the Vanguard Third stage and upon the early receipt of the Vanguard Third stage rocket and spin table hardware.

6. On 4 November, at the Pentagon, I assisted in preparation of the Air Force presentation to the Armed Forces Policy Council. A transcript of this presentation which was made by Major General Mills,* Headquarters, USAF/AFDRD has been previously furnished through channels to Major General Schriever. The contents of this presentation were thoroughly reviewed and agreed to by the Assistant Secretary of the Air Force, Mr. Horner. After the presentation to the Armed Forces Policy Council, General White requested Major General Mills to make the same presentation to the Commander's Conference during the afternoon of 5 November. Later in the day I was advised by AFDRD that a directive to proceed on THOR Space Flight Testing will be forthcoming. After being queried, I advised that we would be prepared to deliver a complete presentation after 14 November.

7. Since the Navy had made similar recommendations to the Armed Forces Policy Council concerning the use of THOR and of the Vanguard Third stages, our plans to visit NRL on 6 November were deemed inappropriate by Brigadier General McCorkle (AFCCM) and Mr. Horner. Arrangements for future meetings will be made after major policy issues are clarified.

SIDNEY GREENE
Lt Colonel, USAF

SIDNEY GREENE, Lt Col, USAF
WS-315A Missiles Development Division

* Maj Gen John S. Mills

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AFDDC 1 Coordination
AFCCS 2 Approval
SAFRD 3 Signature

AFDDC-SP

Colonel Nunziato 74000

12 November 1957

Subject: Outer Space Vehicle

1. The Air Force briefed the Armed Forces Policy Council on 5 November 1957 on Reconnaissance Satellite Program (WS-117L) and possible combinations or vehicles that would be used for cold war and scientific programs.

2. The present Air Force program for WS-117L provides for a first orbital reconnaissance capability in June 1960. To accelerate this program to June 1959 requires additional funds of 5.2 million in FY 58 and 28 million in FY 59.

3. Of the large number of possible combinations that were presented to the Armed Forces Policy Council as cold war and scientific programs which could be considered as a follow-up for Project VANGUARD, the Air Force recommends that the Thor Booster be used and that this program be immediately approved which would provide a satellite on orbit in March 1958. In addition, it is recommended that immediate approval be given for the production of six additional Thor Boosters for this program. The cost of this complete program would be 12 million dollars.

RECOMMENDATION:

4. That the attached memorandum to the Secretary of Defense be signed and dispatched.

2 Incls
1. Prop Memo for Sig w/1 Incl
2. Incoming Memo

W/D

RALPH J. NUNZIATO
Colonel, USAF
Assistant for Special Projects
Deputy Chief of Staff, Development

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WD-57-05279

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[redacted]

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AFDDC-SP:Col Nunziato:lab:74000
12 Nov 57

532

12 November 1957

MEMORANDUM FOR SECRETARY OF DEFENSE
ATTENTION: SPECIAL ASSISTANT
ARMED FORCES POLICY COUNCIL

SUBJECT: Outer Space Vehicle

Reference is made to your memorandum of 6 November 1957, subject as above.

The Air Force Advanced Reconnaissance System (WS-117L) that was presented to the Air Force Policy Council on 5 November 1957 can be accelerated which will provide a first orbital vehicle having a limited reconnaissance capability in June 1959 instead of the presently programmed first orbital date of June 1960. The additional funds required for this accelerated program are 5.2 million in FY 58 and 28 million in FY 59. These funds are required for long lead time items.

There are a large number of combinations of vehicles that can be married together to provide a reconnaissance satellite or cold war and scientific programs which can be considered as a follow up on Project VANGUARD, and to provide important development test vehicles leading to larger reconnaissance and scientific satellites. The Air Force recommends using as the basic booster the Thor, which incorporates the AC Spark Plug Inertial Guidance System since a limited number of Thor boosters could be made available. In fact, three-Thor missiles numbers 114, 116 and 118 could be made available in a relatively short period of time with minimum interference to the IRBM program which would provide a satellite on orbit in March 1958. This is with the understanding that other existing hardware would be made available. Missiles 116 and 118 could be used for either a satellite or a recoverable animal satellite prior to 1 July 1958. An additional six Thor boosters which could be made available from the planned production schedule would be necessary to insure success. The cost of this program would be 12 million dollars, but it is essential that an immediate go-ahead be given if the schedules mentioned above are to be maintained. More detailed information is attached. (Chart 1)

The specific proposal for utilizing Thor to provide a photographic reconnaissance capability using a recoverable satellite has been studied

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and looks feasible. This system would utilize Thor as a first stage; the Lockheed re-entry vehicle as a second stage; and two Recruit Motors as a third stage. This system would provide a payload of 300 pounds on a 150 mile orbit. It would have the capability of photographing over a million square miles in two days of operation. This system would require 18 to 24 months to be operational and would cost approximately 20 million dollars. The funds required would be for the camera, altitude control system and the necessary components to fire the recoverable capsules back to earth. The cost mentioned above would be on a basis that the boosters would be provided as government furnished equipment.

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The Air Force has also studied the use of seven NAVAHO Boosters that have already been assembled. There are an additional five NAVAHO Boosters in various stages of completion. To complete these five additional boosters would cost approximately $500,000. A special program utilizing the NAVAHO Booster as a first stage and various second, third, and fourth stages would cost from 5 to 10 million dollars, depending on the stages and mission to be accomplished. Satellite payload could vary from 75 to 2,000 pounds and payload to the moon can vary from 28 to 270 pounds. These programs could be operational in 8 to 12 months again depending on the mission to be accomplished.

9

The Air Force Advanced Reconnaissance System (Weapon System 117L) utilizes the Atlas Booster. The operational date of WS 117L of June 1959 is based on the availability of the Atlas Booster with minimum interference to the ICBM program. Any other uses of the Atlas Booster would interfer with the ICBM program or WS 117L unless production rates of the Booster were increased.

The Titan Booster will provide a substantial increase in performance and permit reasonably large satellites at very high altitudes, i.e., 22,000 miles. There are studies underway, at the present time, that will provide us with sufficient data to answer your questions. As soon as the studies are completed the data will be made available.

The Air Force recommends that an immediate go-ahead be given to proceed with the program outlined in paragraph 3.

/s/ RICHARD E. HORNER
Assistant Secretary of the Air Force
R&D

8

chart
enclosed

WDGEU-127-58

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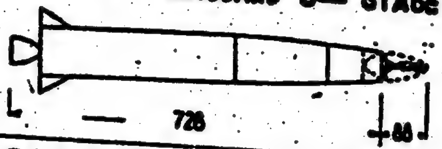
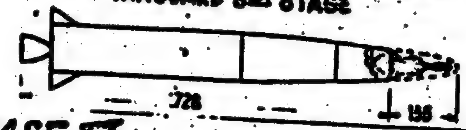
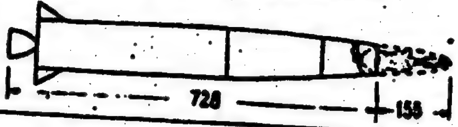
THOR SPACE FLIGHT TESTING

- ACSP INERTIAL SYSTEM ABOARD (FLIGHTS MEET GUIDANCE PROGRAM OBJECTIVES)
- CURRENT WS-315 A/AFMTC FACILITIES AND PERSONNEL WILL BE USED

~~CONFIDENTIAL~~

	MISSION	TIME	MISSILES
CASE I THOR + 1 VANGUARD 3RD STAGE ✲  	160 LB ON 300 MI ORBIT	PRIOR TO 1 MARCH, 1958	114 (AT AFMTC)
CASE II THOR + 4 VANGUARD 3RD STAGE MOTORS ✲ + 1 VANGUARD 3RD STAGE  	600 LB ON 300 MI ORBIT OR 50 LB MOON VICINITY	PRIOR TO 1 MAY, 1958	116 (DELIVERY 12 DEC.) 118 (DELIVERY 10 JAN)
CASE III THOR + SAME AS CASE II OR BETTER  	600+ LB ON 300 MI ORBIT OR 80+ LB MOON VICINITY (INSTRUMENT RECOVERY)	JULY TO DECEMBER 1958	3 TO 6 ADDITIONAL MISSILES

✲ SPIN TABLE USED TO STABILIZE SOLID STAGES

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AIR FORCE BALLISTIC MISSILE DIVISION

[redacted]

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13 NOV 1957

WDTR

SUBJECT: Priority of Systems Developments

TO: Commander
Air Research and Development Command
ATTN: RDZG
P.O. Box 1395
Baltimore 3, Maryland

1. Reference Hq ARDC Programming Note No. 58-6, dated 19 September 1957.

2. The Integrated Priority Listing of Systems Developments contained in the referenced programming note places WS 117L at position sixteen. This priority listing is inconsistent with recent Department of Defense decisions to pursue the WS 117L Program on a maximum effort basis.

3. It is requested that necessary action be taken to establish WS 117L in a position number three, immediately following the IRBM, on the Integrated Priority Listing. This increase in priority is imperative to permit command of funds, manpower, and expeditious actions necessary to conduct the WS 117L Program on a maximum effort basis. The increase in priority is a necessary corollary to action already initiated by Hq ARDC, namely, to place WS 117L in the number four position on the Master Urgency List.

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

WDTR dh WDTR
Major Zelenka 2595

SECRET

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CONFIDENTIAL 13 NOV 1957 20

THIS IS THE MSG WHICH LT COL WORTMAN PROMISED TO SEND T NOGC
MAJ FOX IN A TELECON ABOUT 1 HOUR AGO.

SECRET

533

PP RJWPNF
DE RJEPYB 04X
P 131913Z
FM COMDR ARDC /RDZ COL MACNICKLE/
TO COMDR AFBMD/WDA GEN RITLAND/
BT
/~~S E C R E T~~/ CITE TWX11-033. FOLLOWING LETTER RECEIVED FROM HQ USAF, DATED 7 NOV 57. QUOTE SUBJECT EARLY SPACE VEHICLE CAPABILITY. TO COMMANDER AIR RESEARCH AND DEVELOPMENT COMMAND BALTO MD

1. REFERENCE TELEPHONE COVERSATION BETWEEN MAJ GEN JOHN W SESSUMS, VICE COMMANDER, ARDC, AND COL RALPH J. NUNZIATO, THIS HQ., REGARDING EARLY CAPABILTY TO LAUNCH A SATELLITE OR SIMILAR VEHICLE. IS HAS BEEN SUGGESTED THAT THREE THOR BOOSTERS, NUMBERS 114, 116 AND 118 COULD BE MADE AVAILABLE FROM THE PRESENT IRBM TEST PROGRAM.

2. A NUMBEROF STUDIES HAVE BEEN MADE UTILIZING THE

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DECLASSIFIED. DOD DIR 5200.10

PAGE TWO RJEPYB 04X
THOR BY VARIOUS CONTRACTORS. CONSIDERING THE AVAILABILITY OF THE THOR BOOSTER, IT IS ASSUMED THAT AN EARLY SATELLITE OR SPACE CAPABILITY COULD BE OBTAINED. IT IS REQUESTED THAT YOUR COMMAND INITIATE AN ENGINEERING STUDY WHICH WILL PROVIDE SUFFICIENT INFORMATION TO THIS HQ WITHING THE NEXT 30-45 DAYS ON WHICH A DECISION CAN BE BASED AS TO THE FEASIBILTY, CAPABILITY, AND COST OF SUCH A PROGRAM. THE COMMANDER, AFBMD, HAS BEEN MADE AWARE OF THE INTEREST OF THIS HQ IN SUCH A PROGRAM.

3. YOUR COMMAND IS AUTHORIZED TO COMMIT AND OBLIGATE $100,000 FOR PRELIMINARY DESIGN STUDIES ON THIS PROJECT. $1000,000 IS BEING MADE AVAILABLE TO YOUR COMMAND FOR THIS PURPOSE FROM HQ USAF UNPROGRAMMED SOURCES FOR THE FOLLOWING LINE ITEM IN THE FY 1958 PROGRAM CLN
A-621-609A /SECRET/ BALLISTIC-ROCKET RESEARCH VEHICLE

4. THIS LETTER HAS BEEN COORDINATED WITH THE DIRECTOR OF BUDGET, COMPTROLLER OF THE AIR FORCE, WHO WILL MAKE NECESSARY ADJUSTMENTS.

5. THIS LETTER IS CLASSIFIED SECRET BECAUSE IT MENTIONS A CLASSIFIED PROJECT TITLE. SIGNED SPENCER S HUNN COL USAF

CCC LINE 12 SHOULD READ $100,000 [illegible] [illegible] MAKE

SECRET

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GORY & ENCRYPTION—PHYSICAL [illegible] PRIOR TO CATE-
ERENCES BY DATE-TIME GROUP [illegible]
NO UNCLASSIFIED REFERENCE [illegible] ASSIFICATION

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PAGE THREE RJEPYB 05X
CHIEF PROGRAM FUNDING DIVISON OFFICE ASST FOR DEVELOPMENT PROGRAMMING, DCS/DEVELOPMENT UNQUOTE REQUEST YOUR DIVISION TAKE ACTION TO COMPLY IN ACCORDANCE WITH PREVIOUS CONVERSATIONS BETWEEN GEN PUTT AND GEN SHRIEVER AND WITH USAF PRESENTATION TO ARMED FORCES POLICY COUNCIL. CITED FUNDS WILL BE MADE AVAILABLE TO YOUR DIVISION. [illegible] RECOMMENDATIONS WILL BE MADE TO THIS HQ. IF FURTHER CLARIFICATIO
IS REQUIRED, CONTACT THIS HQ. THROUGH RDZCU.
BT
13/1915Z NOV RJEPYB

XCCC LINE F SIX
RESULTING RECOMMENDATIONS ~~WILL BE MADE AVAIL[illegible] TO YOUR DI~~

RESULTING RECOMMENDATIONS WILL BE MADE TO TIS HQ . IF FURTHER CLARIFIATION IS REQUIRED,

[redacted]

PLS ACK

VCCD ONE THISVLOG

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JC 2443
WDGV 194

~~CONFIDENTIAL~~ NOV 19 .. 2? ..

5-78

IS MR GERGESON THERE LT VOL WORTHMAN HERE

BUIN CHECK
GBBDGUXNDGBOJD

UCAN U STILL READ ME GA

AND SET ME 29 PLS

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DOD DIR 5200.10

AND NOW NOW GA PLS

MR BERGESON IS NOT IN AT THE MOMENT
BUT MRS TIERNEY THE SUPERVISOR IS HERE WILL SHE X XXX CAN SHE FILL
IN FOR MR BERGESON GA
YES

FOR MRS TBBXNSPELLED RITE

I THIS IS A SENSITIVE MESSAGE. PLEASE DELIVER IT ONLY TO
GENERAL RITLAND OR COLONEL HAMILTON. THANK YOUR

PLS ACK

~~SECRET~~

THIS IS MRS TIERNEY HERE I WILL DELIVER TO GEN RITLAND OR COL
HAILEEEEEE HAMILTON FOR U
GA
O
PP RJUPNF
DE RJEPYB 05X
P 191830Z
FM CONDR ARDC /RDZGW LT COL WORTHMAN/
TO CONDR AFBMD/ GENERAL RITLAND/
BT
/~~C O N F I D E N T I A L~~ / CITE TWX11-049.
PART ONE. ON 15 NOVEMBER GENERAL SCHRIEVER MET WITH GENERAL ANDERSON
/GENERAL OSTRANDER, COLONEL KIESSLING, AND I WERE ALSO PRESENT/ FROM
1330 TO 1530 TO DISCUSS RECENT THOR-JUPITER DEVELOPMENTS AND PUBLIC
INFORMATION PROBLEMS. DURING THE LAST TWENTY MINUTES OF THE CONFERENCE,
GENERAL SCHRIEVER DEVELOPED A CASE FOR GIVING THE AFBMD CONTROL OF ALL
PRESENT AND FUTURE TECHNICAL DEVELOPMENT WORK WHICH IS CLEARLY ORIENTED
TOWARD THE SUPPORT OF BALLISTIC OR SPACE WEAPON SYSTEMS. GENERAL
ANDERSON STATED THAT AS OF THAT MORNING HE HAD SIGNED A DIRECTIVE TO
GENERAL DAVIS MAKING HIM RESPONSIBLE, AS AN INDIVIDUAL, REPEAT

"A—PARAPHRASE NOT REQUIRED EXCEPT PRIOR TO CATEGORY B ENCRYPTION—PHYSICALLY REMOVE ALL INTERNAL REFERENCES BY DATE-TIME GROUP PRIOR TO DECLASSIFICATION."

[redacted]

~~CONFIDENTIAL~~

WDSSAT-57-831

~~CONFIDENTIAL~~

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ILLEGIBLE

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~~CONFIDENTIAL~~

SECRET ~~CONFIDENTIAL~~

6-40

PAGE FOUR RJEPYB 05X
[illegible] LEVEL [illegible] TECHNICAL CONTROL. GENERAL OSTRANDER THEN STATED THAT HE
STRONGLY FAVORS ANOTHER SOLUTION WHICH PLACES THE FOCUS HERE IN
BALTIMORE. IT IS THIS CLN APPOINT GENERAL DAVIS THE DEPUTY COMMANDER
FOR SPACE WEAPONS, RESPONSIBLE FOR BOTH SPACE WEAPON SYSTEMS AND SPACE
TECHNICAL DEVELOPMENT SMCLN GENERAL SCHRIEVER TO BE THE OPERATIONAL SYSTEM
[illegible] AT AFBMD, SENDING HIS TECHNICAL DEVELOPMENT REQUIREMENTS TO
GENERAL DAVIS. GENERAL CAPENTER, COLONEL MCHIKLE, AND I COMMENTED
FAVORABLY ON THIS PROPOSAL, BUT GENERAL OSTRANDERS FEELING WAS
STRONG. GENERAL CARPENTER SAID BOTH PROPOSALS WOULD BE PRESENTED TO
GENERAL ANDERSON FOR A DECISION BEFORE 22 NOVEMBER.
[illegible] IN VIEW OF GENERAL ANDERSONS UNSETTLED FEELINGS IN THIS
MATTER, IT IS NOT AT ALL CLEAR WHICH PROPOSAL HE WOULD APPROVE. I
STRONGLY RECOMMEND AN ATTEMPT AT /1/ A DELAYING ACTION REGARDING THE
TIME FOR THIS DECISION, AND /2/ HEAVY CALIBER AFBMD REPRESENTATION
AT SUCH A DECISION MEETING. GENERAL ANDERSON IS ON DUTY WITH A BOARD
IN THE PENTAGON FOR MOST OF THIS WEEK AND CAN BE REACHED THROUGH
[illegible] KAHAN ROOT AT THE VISITING GENERALS OFFICE, OR THROUGH LT COL
[illegible]OLA. I BELIEVE THE AFBMD WOULD HAVE MUCH TO GAIN BY SENDING A TWX MSG
TO HIM, "PERSONAL FROM GENERAL SCHRIEVER TO GENERAL ANDERSON," EXPRESSIN
GENERAL SCHRIEVERS REGRET THAT HE COULD NOT STAY UNTIL THE END OF

PAGE FIVE RJEPYB 05X
FRIDAYS MEETING WITH MR HORNER AND REQUESTING A DEFERRAL OF ANY
FINAL ORGANIZATIONAL ACTIONS UNTIL 2 DECEMBER/AT WHICH TIME GENERAL
SCHRIEVER IS TO MAKE A "FOLLOW-ON" PRESENTATION TO GENERAL ANDERSON/.
PART FIVE KINDLY TREAT THIS AS A PRIVILEGED MESSAGE. DISCLOSURE OF
ITS CONTENTS [illegible] TO [illegible] WOULD
[illegible]STICALLY AND [illegible] ALL THE [illegible]
[illegible] NOV RJEPYB

SECRET

~~CONFIDENTIAL~~

~~SECRET~~

Col Tw[illegible]
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[illegible]

~~CONFIDENTIAL~~

22 November 1957

MEMORANDUM FOR THE RECORD

SUBJECT: Study of THOR for Space Flight Testing

1. A presentation was made at AFBMD on 21 November by the Douglas AC, which summarized progress to date on a study currently being performed as a result of authorization by Hq. USAF to AFBMD to conduct a 30-45 day engineering study of the feasibility of using THOR for space flight testing. The following performance capabilities have been agreed upon by AFBMD, R-W, and DAC.

Case I. An early THOR carrying full instrumentation as well as an AC Guidance System can place a 50-100 lb. satellite on an earth orbit at an altitude averaging 300 miles. This proposal uses a Vanguard solid rocket for a second stage. These calculations were based on 2[illegible] efficiency. Angular accuracy requirements are approximately 3[illegible], and they can be fulfilled through the use of autopilot alone. There appear to be no problems that would prevent an early satellite launch; however, the following factors require further investigation:

a. Missile stabilization

b. Guidance accuracy using autopilot alone

c. Characteristics of the Vanguard solid rocket to maintain spin velocities of 100-200 rpm

d. The uncertainties in ignition delays of the Vanguard rocket

Case II. Two additional stages to THOR consisting of a cluster of four Vanguard solid rockets and a single Vanguard solid rocket can place approximately 50 lbs. on a flight to the moon. Stabilization of the 2nd and 3rd stages will be accomplished by spinning, prior to their separation from the THOR booster. Allowing for all knownfactors, and using the AC Guidance System, it was established that the probability of striking the moon is 25-30%. In case of a miss, an artificial asteroid would be created. Anticipated problems are:

a. Missile stabilization

b. Guidance accuracies

c. Ignition delays

d. Forces experienced by the spinning rockets

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[illegible] 57-55

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2. Present plans call for LAC to present an informal final report on 10 December. AFBMD plans to submit the complete study with costing data on/about 15 December.

3. Of immediate importance is obtaining at least 5 Vanguard 3rd stage engine casings, a Vanguard spintable, and two dozen spin rockets.

Cys furn:
✓Col. Norton
Dr. Mettler
Dr. Thiel
Kurt Patt

SIDNEY GREENE
Lt Colonel, USAF
Weapon Systems 315A

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[illegible]

ITEM 57-56

196

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WDTR

NOV 26 1957

MEMORANDUM FOR COLONEL TERHUNE

SUBJECT: Combined WS 107A-1 - WS 117L Activities - Basic Integration Plan for AFMTC Operations

1. The WS 107A-1 - XSM-65 missile, minus nose cone and adapter, will be mated with the WS 117L orbiting vehicle to boost said vehicle into a pre-arranged boast condition in space, prior to orbital injection.

2. Examination of the WS 117L Flight Schedule indicates that immediate action must be initiated on the part of the WS 107A-1 and WS 117L program offices and associated contractors, to assure the development of an integrated launch operation capability by June 1959 at AFMTC.

3. The following basic plan represents the method by WDTC (WS 107A-1) and WDTR (WS 117L), under joint agreement, will accomplish flight testing for WS 117L at AFMTC. The "plan" pointedly stresses a minimum compromise of the WS 107A-1 objectives, but also a maximum attempt at achieving WS 117L objectives within the limits of whatsoever restrictions may be imposed by the higher priority of WS 107A-1. No serious compromise of WS 117L objectives is anticipated considering the integration circumstances; namely during the R&D test period of the higher priority WS 107A-1. Present planning is predicated on subsequent WS 117L-Cooke operations beginning early in 1960 on a launcher built expressly for WS 117L in the 65-1 complex.

4. Basic Integrated Operations Plan-WS 117L & XSM-65 (WS 107A-1) at AFMTC.

a. All elements of the WS 107A-1 program required for WS 117L testing, whether production items, productive or support services, or management and direction functions, will be GFE to LMSD as prescribed by a production and flight test schedule which will be devised jointly by WDTC and WDTR.

b. The WS 107A-1 Program offices will procure the "elements required" described in (a) above. This will be accomplished by supplemental agreements to existing contracts, with those contractors who will be involved in WS 117L operations by virtue of hardware, services, or technical direction responsibilities in the WS 107A-1 program. All identifiable items will be funded by WS 117L on a reimbursement basis to WS 107A-1.

c. The identical organizational structure, which presently implements the WS 107A-1 program, will be maintained in WS 117L support functions, however, the delegated responsibility of the WS 107A-1 organization will only involve the XSM-65 and its specific operation and contributory support to the over-all WS 117L operation. LMSD will

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be responsible for over-all conduct of WS 117L flight tests, and thus act as WS 117L Test Conductor at AFMTC; under the direction of the AFBMD, WS 117L Test Conductor (who serves as chairman of the Flight Test Working Group). LMSD will publish the WS 117L Detailed Test Objectives; subsequent to coordination with AFBMD and R-W on those items that concern the XSM-65, its support and operation.

d. WS 117L flight testing will begin at AFMTC in June, 1959 at approximately a one-per-month-and-a-half rate for approximately six months. A continued WS 117L AFMTC Test Program, of low inclination orbit flights, is planned for future R&D; a firing rate of one every three or less months is anticipated for this program, which will commence whenever WS 107A-1 facilities again become available for WS 117L use.

e. Since the AFMTC-WS 117L operations will serve to educate LMSD and AFBMD in the procedures and problems associated with utilizing the XSM-65 for WS 117L purposes, the subsequent Cooke WS 117L operations will be again directed by LMSD under AFBMD supervision. The type and supervision of XSM-65 launching and handling crews at Cooke AFB, which will support WS 117L, is not considered here.

5. The inclosed charts illustrate, in general, the functions and responsibilities involved in implementing the above described "plan" for AFMTC. Again, all WS 107A-1 program elements, contributing to the support of WS 117L operations at AFMTC, will be achieved under the same organizational structure as presently exists in the WS 107A-1 program.

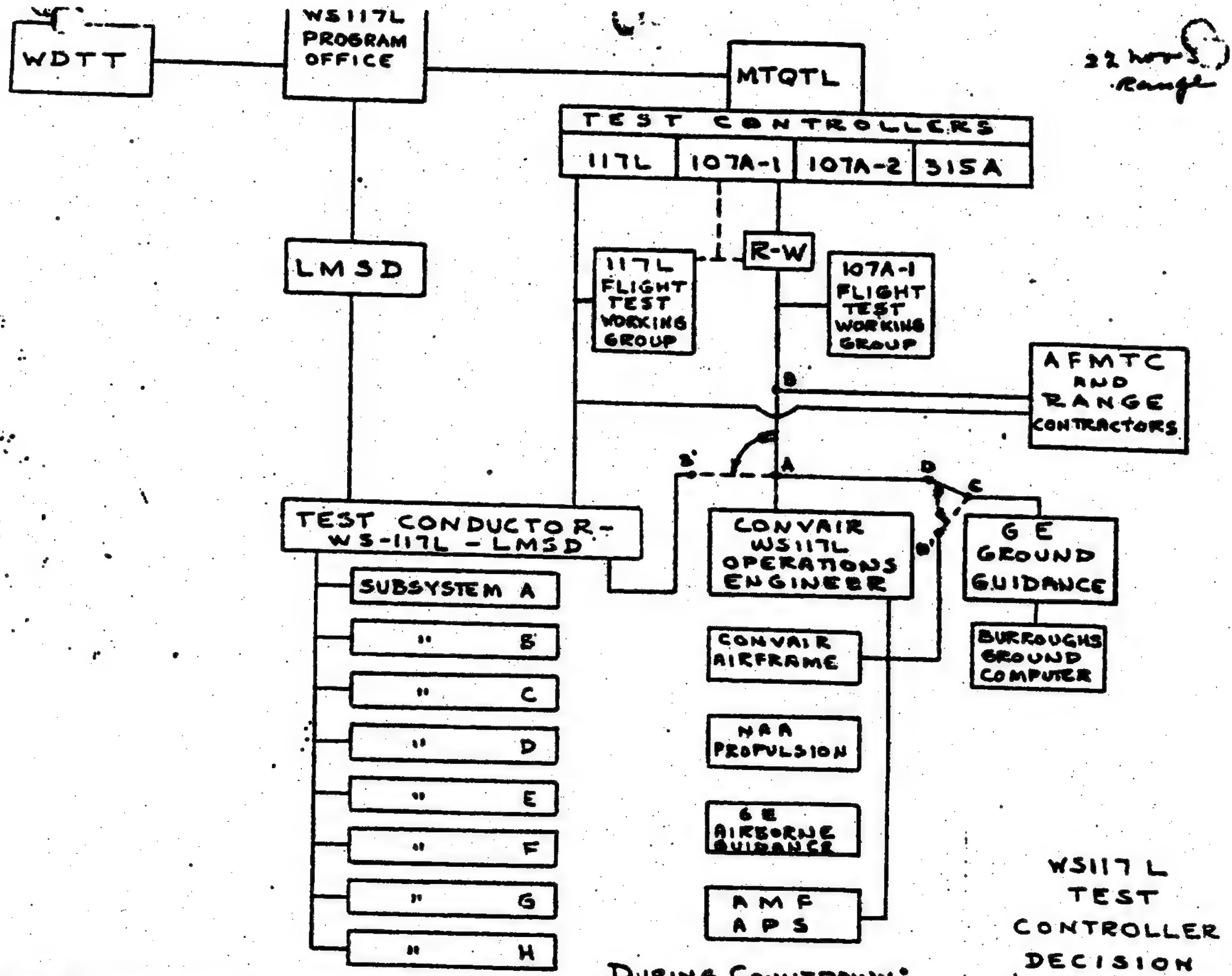
6. LMSD has prepared an itemized list of work that is, in view the WS 117L Test Schedule, required immediately of WS 107A-1 contractors. LMSD sorely needs XSM-65 hardware and operations data for planning the forthcoming integration, but cannot proceed without established contractual relationships.

7. The "plan for AFMTC", described above, reflects essentially a "modus operandi" approved by Colonel Eichel, AFBMD Field Office at AFMTC, based on previous conversations with Lt. Colonel Morgan and Captain Roy of that office. However, the actual "plan", as worded above has not been coordinated with Colonel Eichel as yet, but will shortly reflect his recommendations on the subject.

for - Quentin A. Riepe
FREDERIC C. E. ODER
Colonel, USAF
Director, WS 117L

4 Incls: (UNCL)
1. Organ for WS 117L Operations at AFMTC
2. WS 117L Data Handling Process AFMTC Operations
3. Establishment Procedure for Detailed Test Objectives
4. WS 107A-1 Flight Test Working Group

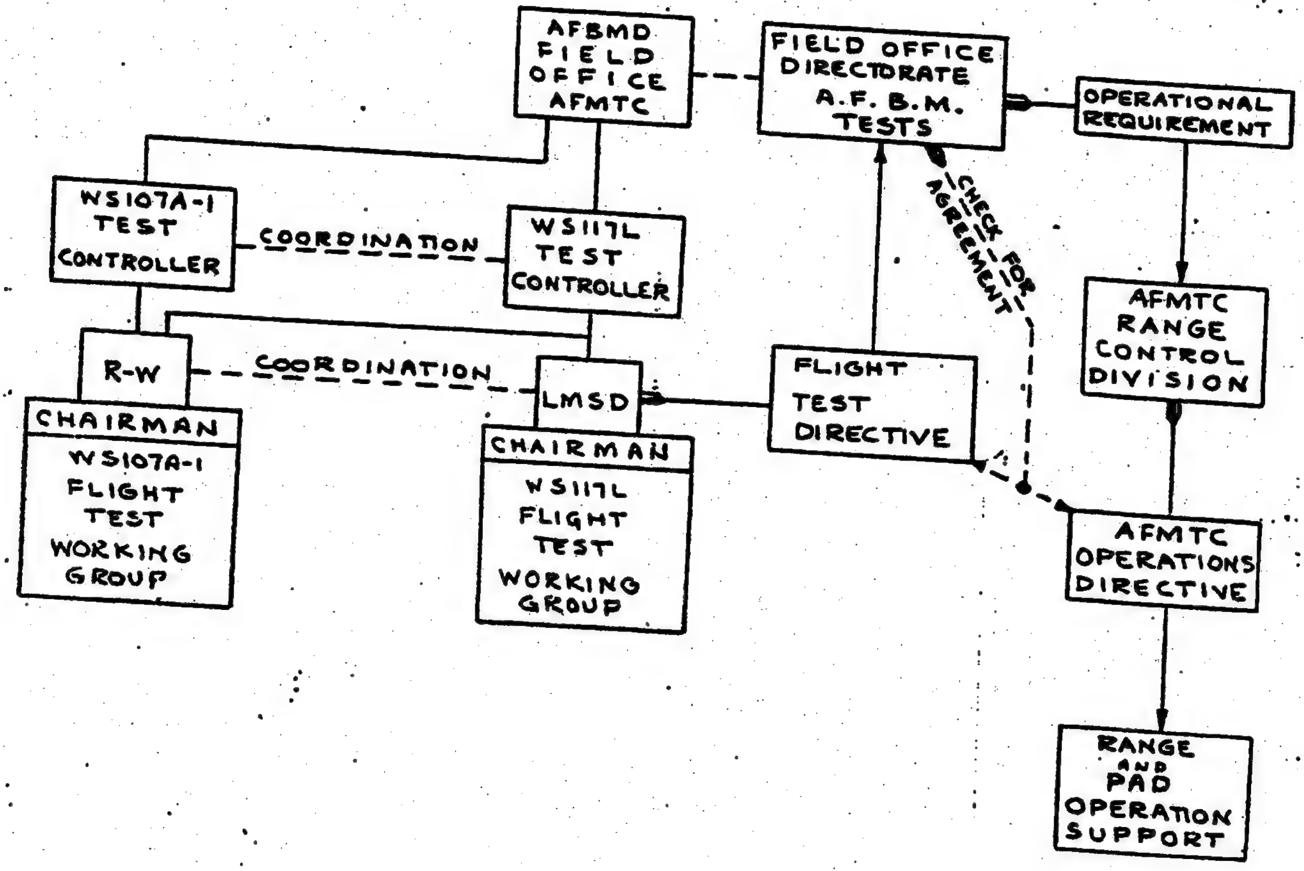
22 Nov 58
Range


WDTT
WS117L PROGRAM OFFICE
MTQTL
TEST CONTROLLERS
117L
107A-1
107A-2
315A
R-W
LMSD
117L FLIGHT TEST WORKING GROUP
107A-1 FLIGHT TEST WORKING GROUP
AFMTC AND RANGE CONTRACTORS
B
B'
A
D
C
D'
TEST CONDUCTOR - WS-117L - LMSD
SUBSYSTEM A
" B
" C
" D
" E
" F
" G
" H
CONVAIR WS117L OPERATIONS ENGINEER
G E GROUND GUIDANCE
BURROUGHS GROUND COMPUTER
CONVAIR AIRFRAME
NAA PROPULSION
GE AIRBORNE GUIDANCE
AMF APS
WS117L TEST CONTROLLER DECISION

ORGANIZATION FOR
WS-117L OPERATIONS AT AFMTC

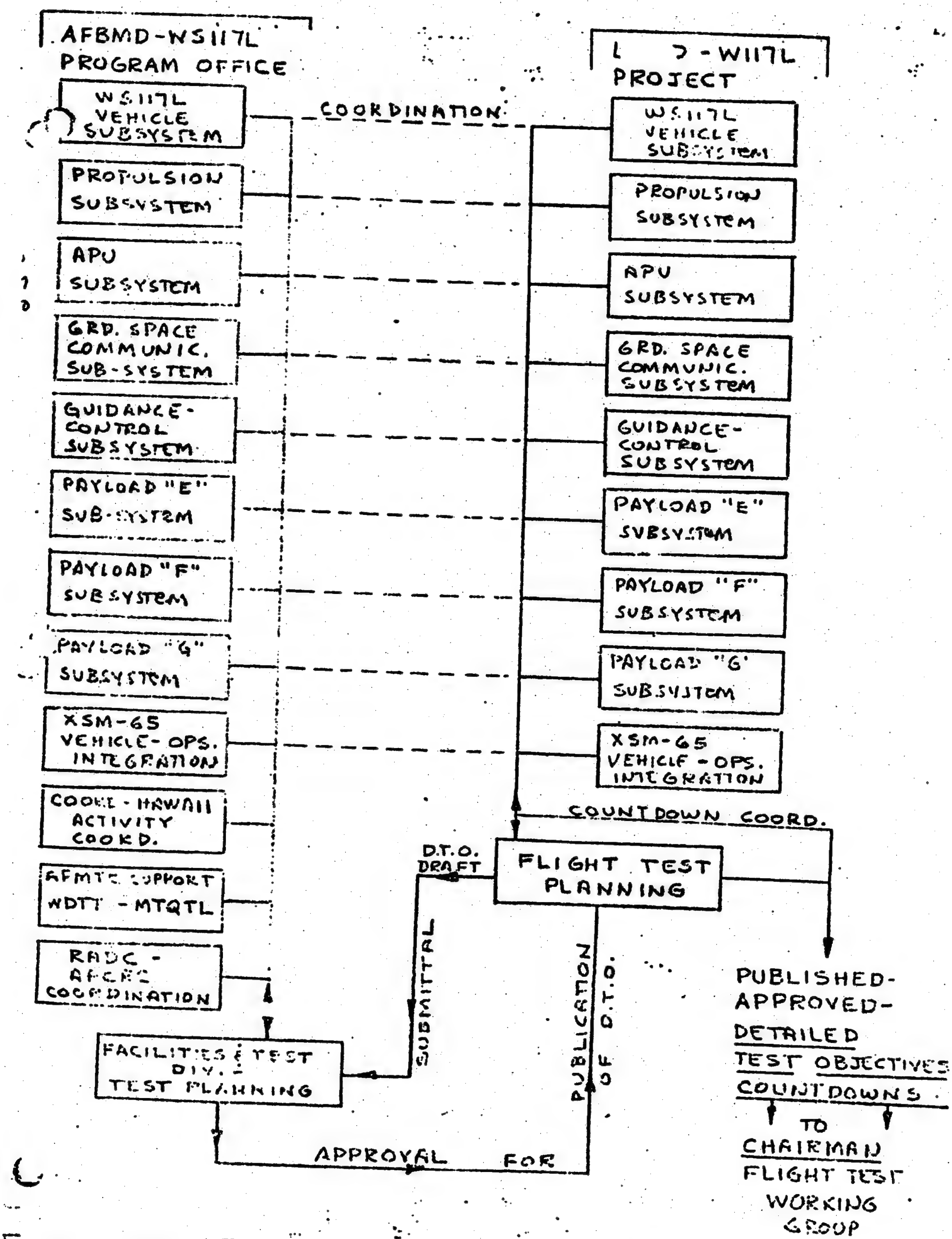
DURING COUNTDOWN:

LINES AB & CD APPLY BEFORE
LINES AB' & CD' APPLY AFTER
SERVICE STRUCTURE REMOVAL


AFBMD FIELD OFFICE AFMTC
FIELD OFFICE DIRECTORATE A.F.B.M. TESTS
OPERATIONAL REQUIREMENT
WS107A-1 TEST CONTROLLER
COORDINATION
WS117L TEST CONTROLLER
CHECK FOR AGREEMENT
AFMTC RANGE CONTROL DIVISION
R-W
COORDINATION
LMSD
FLIGHT TEST DIRECTIVE
CHAIRMAN
WS107A-1 FLIGHT TEST WORKING GROUP
CHAIRMAN
WS117L FLIGHT TEST WORKING GROUP
AFMTC OPERATIONS DIRECTIVE
RANGE AND PAD OPERATION SUPPORT

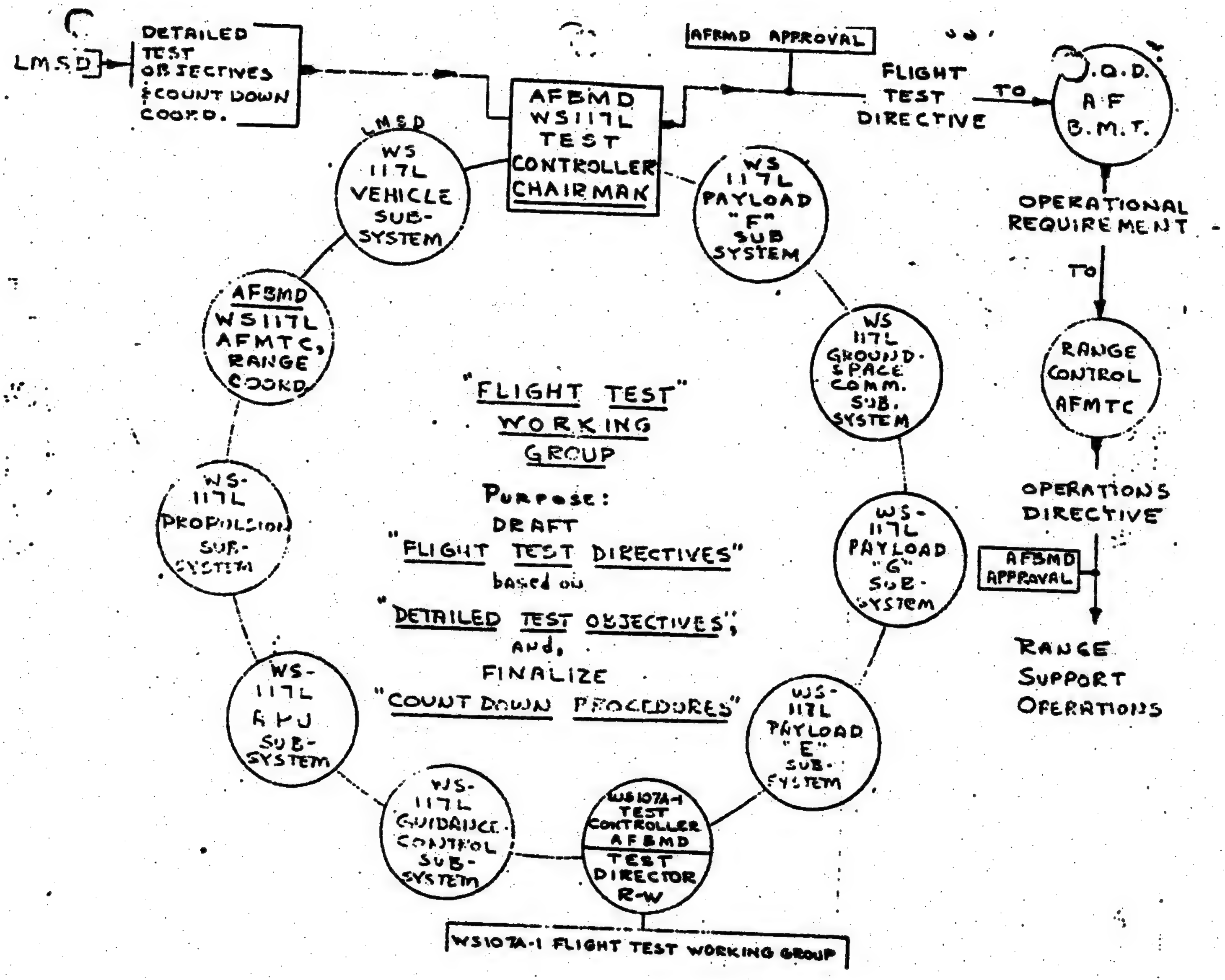
Organization for

WS117L Flight Test Planning at AFMTC


AFBMD-WS117L PROGRAM OFFICE
WS117L VEHICLE SUBSYSTEM
PROPULSION SUBSYSTEM
APU SUBSYSTEM
GRD. SPACE COMMUNIC. SUB-SYSTEM
GUIDANCE-CONTROL SUBSYSTEM
PAYLOAD "E" SUB-SYSTEM
PAYLOAD "F" SUBSYSTEM
PAYLOAD "G" SUBSYSTEM
XSM-65 VEHICLE-OPS. INTEGRATION
COOKE-HAWAII ACTIVITY COORD.
AFMTC SUPPORT WDTT - MTQTL
RADC - AFCRC COORDINATION
COORDINATION
L D-W117L PROJECT
WS117L VEHICLE SUBSYSTEM
PROPULSION SUBSYSTEM
APU SUBSYSTEM
GRD. SPACE COMMUNIC. SUBSYSTEM
GUIDANCE-CONTROL SUBSYSTEM
PAYLOAD "E" SUBSYSTEM
PAYLOAD "F" SUBSYSTEM
PAYLOAD "G" SUBSYSTEM
XSM-65 VEHICLE-OPS. INTEGRATION
COUNTDOWN COORD.
D.T.O. DRAFT
FLIGHT TEST PLANNING
SUBMITTAL
PUBLICATION OF D.T.O.
FACILITIES & TEST DIV. - TEST PLANNING
APPROVAL FOR
PUBLISHED-APPROVED-DETAILED TEST OBJECTIVES COUNTDOWNS
TO CHAIRMAN FLIGHT TEST WORKING GROUP

ESTABLISHMENT PROCEDURE FOR DETAILED TEST OBJECTIVES & COUNTDOWNS

WS117L F[illegible] TESTS


LMSD
DETAILED TEST OBJECTIVES & COUNT DOWN COORD.
AFBMD WS117L TEST CONTROLLER CHAIRMAN
AFBMD APPROVAL
FLIGHT TEST DIRECTIVE
TO
D.O.D. A F B.M.T.
OPERATIONAL REQUIREMENT
TO
RANGE CONTROL AFMTC
OPERATIONS DIRECTIVE
AFBMD APPROVAL
RANGE SUPPORT OPERATIONS
LMSD
WS 117L VEHICLE SUB-SYSTEM
WS 117L PAYLOAD "F" SUB SYSTEM
WS 117L GROUND-SPACE COMM. SUB. SYSTEM
WS-117L PAYLOAD "G" SUB-SYSTEM
WS-117L PAYLOAD "E" SUB-SYSTEM
WS107A-1 TEST CONTROLLER AFBMD
TEST DIRECTOR R-W
WS-117L GUIDANCE CONTROL SUB-SYSTEM
WS-117L APU SUB-SYSTEM
WS-117L PROPULSION SUB-SYSTEM
AFBMD WS117L AFMTC, RANGE COORD.
"FLIGHT TEST" WORKING GROUP
Purpose:
DRAFT "FLIGHT TEST DIRECTIVES" based on "DETAILED TEST OBJECTIVES", and, FINALIZE "COUNT DOWN PROCEDURES"
WS107A-1 FLIGHT TEST WORKING GROUP

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[redacted]

19

C O P Y

MCPTRM

27 November 1957

SUBJECT: Overtime Policy - 117L Program

TO: Department of the Air Force
Chief of Staff, Hq USAF
ATTN: AFCGM
Washington 25, D. C.

1. At the present time, the 117L Program is governed by the overtime restrictions as defined in Air Force Procurement Circular #10 dated 8 October 1957, which limits overtime on Air Force Programs other than Ballistic Missiles to two percent of programmed manhours.

2. The Advanced Reconnaissance System (117L) described in the development plan, was designed to fulfill the military requirement outlined in GOR #80 (SA-2c), 16 March 1955, ARDC SR #5, 17 October 1955, USAF DD #85, 3 August 1956 and ARDC SDD #117L, 17 August 1956. The system will provide a surveillance capability which will be global in scope. Such a system is a natural companion of the Ballistic Missile program. Not only will its employment serve to reveal any preparation for attack well in advance of the event, but in addition, it will provide a means of obtaining accurate up-to-date target information. Bomb damage assessment and other current target information is an essential ingredient in the effective deployment of any strategic weapon.

3. The inter-relationship between the two programs indicates that timely development and production is as important in the 117L Program, as it is in the Ballistic Missile Program. An essential factor in the development picture is one of overtime policy. It is, therefore, felt that the overtime policy presently applied to the ICBM/IRBM Program should be broadened to include the 117L Program. In respect to the overtime policy, authority is requested to consider the 117L Program as a portion of the Ballistic Missile Program.

FOR THE COMMANDER:

cc: Lt Col Seay, MCPTA

ORIGINAL SIGNED BY
SHERMAN E. ELLIS
Colonel, USAF
Chief, Production Staff Division
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted]

WD-57-06078

57 MCP 25577
(Series B) [illegible]

RDZ 198

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

AFDRD-SS

NOV 27 1957

SUBJECT: Approval of Development Plan for WS 117L

TO: Commander
Air Research and Development Command
Post Office Box 1395
Baltimore 3, Maryland

1. The revised Development Plan for WS 117L dated 16 July 1957 is approved.

2. There is a possibility that the development of WS 117L may be accelerated in the near future due to the active national interest in systems of this type.

3. Due to the recent change in the development urgency associated with this system, and a finalization of funding requirements, a revised Development Plan outlining new goals and objectives is required. It is therefore recommended that the revised plan:

a. Restate the expected capabilities as design objectives.

b. Provide more detailed information on the development and testing of the airborne and ground components of the sensor systems.

4. More detailed information and drawings on each sub-system are required in this headquarters. It is recommended that this be accomplished by appendices to the Development Plan or by Status Reports.

FOR THE CHIEF OF STAFF:

HABoushey
H. A. BOUSHEY
Brigadier General, USAF
Deputy Director of
Research and Development
Office, DCS/Development

N

WDTR 199

F

3 DEC 1957 20

B
DE RJEPYB 02X
P 031944Z
FM COMDR ARDC/RDZGW LT COL WORTHMAN/
TO COMDR AFBMD/WDTR COL ODER/
BT

/UNCLAS/ CITE TWX 12-009. THE FOLLOWING LETTER FROM GENERAL BOUSHEY TO COMMANDER ARDC IS BEING FORWARDED TO YOU OFFICIALLY, AND IS QUOTED NOW FOR YOUR EARLY INFORMATION CLNDEPARTMENT OF THE AIR FORCE NOV 27 1957 SUBJECT APPROVAL OF DEVELOPMENT PLAN FOR WS117L TO COMDR ARDC BALT MD

1. THE REVISED DELOPMENT PLAN FOR WS 117L DATED 16 JULY 1957 IS APPROVED.

2. THERE IS A POSSIBILITY THAT THE DEVELOPMENT OF WS117L MAY BE ACCELERATED IN THE NEAR FUTURE DUE TO THE ACTIVE NATIONAL INTEREST

PAGE TWO TJEPY B02X
IN SYSTEMS OF THIS TYPE.

3. DUE TO THE RECENT CHANGE IN THE DEVELOPMENT URGENCY ASSOCIATED WITH THIS SYSTEM, AND A FINALIZATION OF FUNDING REQUIREMENTS, A REVISED DEVELOPMENT PLAN OUTLINGING NEW GOALS AND OBJECTIVES IS REQUIRED. IT IS THEREFORE RECOMMENDED THAT THE REVISED PLAN CLN

A. RESTATE THE EXPECTED CAPABILITIES AS DESIGN OBJECTIVES.

B. PROVIDE MORE DETAILED INFORMATION ON THE DEVELOPMENT AND TESTING OF THE AIRBORNE AND GROUND COMPONENTS OF THE SENSOR SYSTEMS.

4. MORE DETAILED INFORMATION AND DRAWINGS OF EACH SUB-SYSTEM ARE REQUIRED IN THIS HEADQUARTERS. IT IS RECOMMENDED THAT THIS BE ACCOMPLISHED BY APPENDICES TO THE DEVELOPMENT PLAN OR BY STATUS REPORTS.

FOR THE CHIEF OF STAFF H A BOUSHEY BGEN USAF DEPUTY DIRECTOR OF RESEARCH AND DEVELOPMENT OFFICE, DCS/DEVELOPMENT UNQUOTE
BT
03/1946Z DEC RJEPYB

559

200

COPY TWX

4 December 1957

FROM: COMDR HQ ARDC
TO: COMDR AFBMD

UNCLASSIFIED FROM RDZCP-12-4-E. FOR WDG, ATTN: GENERAL RITLAND. REFERENCE TWX,11-033, QUOTING HQ USAF LETTER, DATED 7 NOV 1957. YOU ARE AUTHORIZED TO COMMIT AND OBLIGATE $100,000 FOR PRELIMINARY DESIGN STUDIES ON THIS PROJECT. FUNDS IN THIS AMOUNT WILL BE MADE AVAILABLE UNDER A621609A.

[redacted] [redacted]

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

REPORT OF THE SCIENTIFIC ADVISORY BOARD
AD HOC COMMITTEE ON SPACE TECHNOLOGY

6 December 1957

This document consists of 2 pages

Copy 32 of 140 copies

Advance Series

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

6 December 1957

REPORT OF THE SCIENTIFIC ADVISORY BOARD

AD HOC COMMITTEE ON SPACE TECHNOLOGY

Sputnik and the Russian ICBM capability have created a national emergency. In the rocket field the Air Force should make a maximum contribution to a proper national response. The following active programs are recommended:

1. Obtain a massive first generation IRBM and ICBM capability as soon as possible.

2. Establish a vigorous program to develop second generation IRBM's and ICBM's having certain and fast reaction to Russian attack.

3. Accelerate the development of reconnaissance satellites.

4. Establish a vigorous space program with an immediate goal of landings on the moon.

5. Obtain as soon as possible an ICBM early warning system.

6. Pursue an active research program on anti-ICBM problems. The critical elements are decoy discrimination and radar tracking. When these problems are solved a strong anti-ICBM missile system should be started.

Mr. David T. Griggs
Dr. Clark B. Millikan
Dr. Mark M. Mills
Mr. W. H. Radford
Dr. H. Guyford Stever
Dr. Edward Teller
Dr. C. S. White

[redacted]

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C7-26581

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

Scientific Advisory Board to the Chief of Staff

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Dr. Mark M. Mills	" "	10
Mr. Chester N. Hasert		
The Rand Corporation, 1625 Eye St., NW (Washington Office)		95
The Rand Corporation, Santa Monica Office, (Attn: The Director via USAF Liaison Office The RAND Corp. 1700 Main St.)		96 97,98 99,100 101

[illegible] 0

202

THE RAMO-WOOLDRIDGE CORPORATION

LOS ANGELES 45, CALIFORNIA

INTEROFFICE CORRESPONDENCE

TO: L. G. [illegible]

CC: D. [illegible], Major
G. [illegible]

DATE: 18 December 1957

SUBJECT: [illegible] Organization for Project [illegible]

FROM: L. G. [illegible]

[redacted]

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Lillie's

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~~CONFIDENTIAL~~ 23 DEC 1957

8

WDTR

Mr. L. Eugene Root
Vice President and General Manager
Lockheed Aircraft Corporation
Missile Systems Division
P. O. Box 504
Sunnyvale, California

Dear Mr. Root:

This is in reply to your letter of 26 November 1957 (LMSD/36469). As was discussed in the meeting at the Air Force Ballistic Missile Division on 5 December 1957, I think it highly desirable that specific development planning toward the augmentation and acceleration of the present WS 117L program be accomplished without delay between LMSD and AFBMD.

In order to be effective, any recommendations we wish to make to the Air Staff in this regard can not be delayed too long. Accordingly, I suggest that every attempt be made to complete the planning phase for final review by me not later than 15 January 1958, and earlier if possible.

It would seem most desirable if your goal for the new program were specifically directed toward the most important reconnaissance payloads. While the use of infra-red sensors may well be of future importance I am not convinced that we have gone far enough to warrant its use in the early program. On the other hand, the use of a recovery package is a worthwhile backup to our present WS 117L data recovery concept.

I appreciate your efforts toward the streamlining of the Lockheed Missile Systems Division organization for the WS 117L task and believe that these are essential. There are several factors, most of recent origin, which make me doubt that on the part of the Air Force, we can go as far in our streamlining of organization as was the case in the project you mentioned which Kelly Johnson headed for Lockheed.

DOWNGRADED AT 12 YEAR
INTERVALS: NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

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[redacted] ~~CONFIDENTIAL~~

As to your question on the role Kelly Johnson could play, I am sure you are in a better position than I am to consider this. I do believe, however, that Mr. Johnson's knowledge of how to control and operate an expedited program would be of exceptional value to LMSD's work on WS 117L.

Sincerely,

ORIGINAL SIGNED:
B. A. SCHRIEVER

~~CONFIDENTIAL~~

WDTR
Col. Oder

IZ
2531

[redacted]